

FLIGHT

The
AIRCRAFT ENGINEER
AND AIRSHIPS

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DIARY OF CURRENT AND FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in this list:—

- Oct. 15. Cardiff Air Display and Race from Heston.
- Oct. 18. Aero Golfing Society: Cellon Challenge Cup, West Hill G.C.
- Oct. 18. Henly's Annual Dance, Mayfair Hotel, W.
- Oct. 19. "Progress in Civil Aviation." Lecture by Lt.-Col. F. C. Shermidine, before R.U.S.I.
- Oct. 20. "Flying Conditions on the West Coast of Africa." Lecture by Flight-Lieut. W. G. Pudney, before R.Ae.S.
- Oct. 23. Close of Berlin Sporting Flying Exhibition.
- Oct. 27. "Aeroplane Covers and Wheels." Lecture by Mr. F. Fellowes, before R.Ae.S. (Joint Meeting with Inst. of Rubber Industry.)
- Nov. 3. "Civil Primary Training." Lecture by Mr. H. G. Travers, D.S.C., before R.Ae.S.
- Nov. 4. Central Flying School Reunion Dinner, May Fair Hotel, W.
- Nov. 5. No. 208 Sqdn. R.A.F. Reunion Dinner, Carr's Restaurant, Strand, W.C.
- Nov. 10. "Aircrew Design." Lecture by Mr. D. L. Hollis Williams, B.Sc., A.F.R.Ae.S., before R.Ae.S.
- Nov. 18-Dec. 4. Paris Aero Show.
- Nov. 24. "The Evolution of Aircraft Wireless Equipment." Lecture by Sqdn.-Ldr. H. Leedham, O.B.E., R.A.F., before R.Ae.S.
- Nov. 25. Norfolk and Norwich Ae.C. Annual Ball.
- Nov. 26. Comrades of the R.A.F. Reunion Dinner, Harrods'.
- Dec. 1. "The Behaviour of Fluids in Turbulent Motion." Lecture by Mr. A. Fage, A.R.C.Sc., F.R.Ae.S., before R.Ae.S.
- Dec. 8. "Air Survey." Lecture by Lieut. J. S. A. Salt, R.E., before R.Ae.S.
- Dec. 14. "Air Power and Disarmament." Lecture by Group Capt. J. T. Babington before R.U.S.I.
- Dec. 15. "Airship Development Abroad." Lecture by Sqdn.-Ldr. R. S. Booth, before R.Ae.S.
- Dec. 15. "Lessons of the DO.X." Lecture by Dr. C. Dornier, before R.Ae.S.

EDITORIAL COMMENT



AIRCRAFT history, like other history, has a curious habit of repeating itself. Just now we appear to be witnessing the return swing of the pendulum in two directions which may prove of importance in the development of aircraft; the revival of two phases of flying: The return to the low-powered aeroplane, and the reversal of pilot and engine position, with the pilot in front.

"Motor-assisted glider" was a term coined to describe the machines which competed for the prizes offered by His Grace the Duke of Sutherland, by the S.M.M.T., by the *Daily Mail* and others in 1923 at the Lympne meeting of that year. The expression was unfortunate in the extreme, although not all will agree that it was responsible for "killing" the type which it was employed to denote. Before a glider can be said to be "motor-assisted," it is necessary that the small engine with which it is provided shall be able not only to be stopped in the air (that used to be easily accomplished, more often than not by the engine itself), but also re-started in the air. Thus only can the pilot of such hybrid craft use his engine for regaining height lost by running out of up-currents. In other words, the "motor-assisted glider" should be regarded as rather the counterpart of the sailing boat fitted with a small low-power auxiliary engine, not powerful enough to be the main propelling agent, but certainly useful for getting home when the wind falls flat, or when the tide turns contrary. Some day someone will produce a small and light engine useful for this purpose, and having a starter mechanism which can be relied upon to get the engine going when wanted.

The 1923 Lympne machines were not of this sort. They were, for the most part, fitted with "hotted-up" motor-cycle engines, some flat twins and some of the two-cylinder vee type, but all air-cooled. The competition resulted in the production of such types of aircraft as the English Electric Company's "Wren," the Air Navigation Company's "Anec I," the De Havilland D.H. 53, the Avro biplane and monoplane, types 558 and 560 respectively, the

Gloster "Gannet" biplane, the Parnall "Pixie," the Vicker's "Viget" and several others. From a competition point of view, the "Wren" and the "Anec" were the most successful types, tying for the first prize for low fuel consumption. Both did the rather amazing mileage of 87.5 miles per gallon of petrol. The "Anec" also got first prize for ceiling, with 14,400 ft. to its credit, while the Avro monoplane completed 80 laps of the 12.5 miles circuit, or a total of 1,000 miles during the week.

It will, we think, be agreed that these were extraordinary performances. Yet the only machine which was used really extensively later was the little D.H. 53, which did nothing much in the competition but which afterwards, when fitted with the Bristol Cherub engine, did quite a lot of useful flying. If one asks oneself why those little machines never "caught on," the answer can be expressed in one word: "Engines." It was not, in our opinion, the small power of the engines (the "Wren" had but 10 b.h.p. maximum at its disposal) which proved the obstacle. Nor was it altogether the qualities of the aeroplanes, which on the whole were very efficient, and although light were not as flimsy as might be expected. But the engines exhibited a uniformly high standard of unreliability! Speeds of nearly 60 m.p.h. were recorded for several machines, and the little "Pixie," with small wings, even put up 76 m.p.h. The "Wren," in spite of its 10 h.p., did more than 50 m.p.h. There is little doubt that, had the engines been reliable, the machines would have been the forerunners of cheap aerial runabouts. The one objection that could be raised, apart from engine unreliability, was that all machines were necessarily (in view of the low engine powers) single-seaters.

In the following year another competition was held at Lympne. This time competing aircraft had to be of the two-seater type, and the engine capacity was limited to 1,100 c.c. Again quite a large number of types was produced, but none which survived as a quantity-production model. The two-seaters were, on the whole, better aircraft than had been the single-seaters of the previous year, but engine unreliability was again rampant. In fact, the younger generation, private-ownerly speaking, who has experience of the modern light-plane engine only, with its wonderful reliability, can hardly be expected to realise how thoroughly unreliable an engine *can* be. The sum total was that, as we have said, none of the types went into quantity production afterwards. What happened, and it may be of interest to recall a fact which in these days is likely to be overlooked, was that the Air Ministry decided to subsidise a number of flying clubs, provided these used light aeroplanes. The view was generally held that an engine capacity of 1,100 c.c. was insufficient, and that the unreliability of the Lympne engines in the 1924 competition was due to running the engines too hard. In the meantime, the A.D.C. company had produced the Cirrus engine of 4,500 c.c., while concurrently the De Havilland Aircraft Co. had produced the Moth. The rest of the history of the "light" aeroplane as we know it to-day will be familiar to all our readers.

At the present time there is an obvious tendency towards reverting to light machines fitted with engines of lower power than those to which we have now become accustomed. This is so not only in this country but also in Germany. When it is remembered that, for years after we abandoned the

1,100-c.c. ideal, German designers continued to turn out machines of approximately that class (only in the end to abandon it and make a desperate effort to catch up with Great Britain in the race towards first 100, then 120, and finally 150 or so h.p.), the return to the earlier modest ideal is rather interesting. What the upshot will be no man may say. That we shall ever go back to the 400-, 600- or 750-c.c. engines of the 1923 light aeroplanes seems unlikely. That we *shall* see single-seaters with engines developing some 30 h.p. and two-seaters with 40-50 h.p. engines, seems likely. But before that can come about, engines of around these powers, and of as good reliability as our present larger engines, are the first consideration. In other words, it is up to the engine designers. The Air Ministry can help greatly. It can even help enormously by not placing quite so many obstacles in the way of early development. There is no terrible crime in letting an enthusiastic experimenter go into the air over an aerodrome with an engine which is unblessed by Farnborough. Aircraft design has progressed somewhat since 1923. What is wanted is an engine of approximately the power we have outlined, but it must be smooth and it must be reliable. An engine which is ever on the point of shaking itself out of the machine is no manner of use. Nor is one which stops every two or three hours.

The second direction in which history is promising to repeat itself is in the matter of "pusher" arrangements of the engine. Some of the earliest machines were of the "pusher" type. The Wrights in America, the Voisins and Farman in France and the Howard Wrights and Bristols in England. Then A. V. Roe introduced the tractor in England, Bleriot in France, and soon the poor old "pusher" disappeared. If one looks for the reason it is to be found mainly in the high drag of the open tail-girder systems used, in the high "stilty" undercarriage which the low placing of the old pusher engines required, and possibly to a slight extent to the difficulty of cooling air-cooled engines of other than the rotary type. The net result was a marked inferiority in performance for a given engine power.

With modern methods of construction and modern knowledge of aerodynamics, it should not be impossible to overcome most, if not all, of these drawbacks. The "pusher" should be capable of coming somewhere near the ubiquitous tractor in aerodynamic efficiency. But, the tractor advocates will say, why do we want "pushers"? There are several advantages in this arrangement. Far and away the most important is that of view. No matter how carefully designed, the tractor aeroplane, even with the inverted engine, gives a very considerable "blind" cone. The pusher, on the other hand, gives to all intents and purposes unobstructed vision in the most important directions.

A second advantage of the engine-behind arrangement is that the occupants are out of the pulsating slipstream. Effective windcreens can be made to give in an open machine as good protection from draught as gives the cabin of an enclosed tractor aeroplane. Oil and exhaust fumes from the engine do not reach the occupants, so that the "pusher" is cleaner altogether. And, finally, the noise from an engine behind seems to be much less than from an engine in front. It may be a little difficult to produce theoretical reason for this, but it seems to be the unanimous opinion of all who have flown in "pushers." So let the good work proceed.

THE D.E.L.A. EXHIBITION

By EDWIN P. A. HEINZE

AN unusually interesting and instructive aero show was opened at Berlin on October 1 and is to remain open till October 23. It is located in the Berlin exhibition halls surrounding the foot of the big radio tower, and comprises numerous exceedingly well arranged sections giving a very fine survey of the history of flying and the present state of sport flying in Germany. Military and transport flying is excluded from this show, which proposes to appeal solely to the average citizen with a view to fostering active interest in every sphere of civil flying. Entering the first hall one comes into an historic and futuristic section. Bays along the side contain valuable historical material, while the large centre space shows a number of curious machines purporting to give an idea of future development. Several of these machines, such as the one looking like a gliding boat with wings, are actual designs. The machines shown are, however, only full-scale models made of plywood and cardboard (or, as we should call them, "Mock-ups"—Ed.). In the next section are exhibited a number of industrially-produced light aeroplanes, most of them being wholly new models, to which we will refer later. In this hall also the now available German light-aeroplane engines, Argus, Hirth, Siemens and BMW, are displayed. Following on this comes a section displaying methods of tuition and the equipment of aeroplanes and balloons. Sectional working models of aeroplanes and engines enable even the veriest novice to obtain an inkling of how everything works and how aeroplanes are controlled. The next section displays a number of scale models of aerodromes, and includes apparatus and machines comprising the ground organisation. In a number of bays the results of the various aeroplane competitions held in recent years in Germany are illustrated, showing the actual winning machines, or models of them. From here one enters a long and narrow hall devoted to model aeroplanes. Numerous German clubs have exhibited the various models with which they were successful in various competitions. Here also a model workshop is shown with boys building model aeroplanes. The next and final hall contains numerous gliders, soarers and motor aeroplanes, built

mostly by the various German clubs in their own workshops. The workshop of a Berlin school has been transplanted to this hall, and young men are constantly at work in it building a new large soarer.

Returning to the industrial section, one is struck with the attractive appearance of a four-seater saloon aeroplane publicly shown for the first time by the Klemm Company. It is not a very fast but a very comfortable machine, of the type one might term a "fly-about" for the family man. Its cabin is spacious and comfortable, with two sets of wicker-work armchairs side by side. Also, the walls are lined by wicker-work, which gives the interior a bright "week-end" kind of appearance, wholly pleasing. Ample luggage space is provided behind the rear seats. The cabin top and sides are entirely of glass, with sliding side and opening windshield panes. The design of the machine, a low-wing monoplane, is typical of Klemm. It is built entirely of wood, and access to the cabin is attained over the wings, the cabin top being divided longitudinally down the centre and hinged on the front uprights so the two halves can open like a door. In case of emergency, the whole top can be thrown off instantaneously by the operation of a single lever. The span of the wing is 44.3 ft. (13.5 m.), the wing area 224 sq. ft. (20.8 sq. m.), and the length of the machine 28.21 ft. (8.6 m.). The machine can be had fitted optionally with a 150-h.p. Siemens, Argus or 120-h.p. Gipsy engine. Maximum speed with a Siemens is 118 m.p.h., normal flying speed 106 m.p.h., and landing speed 50 m.p.h.

A great centre of attraction is a new small amphibian, which Dornier has developed in all secrecy. [This was described last week.—Ed.]

Another very interesting exhibit is that of the new fast Messerschmitt sports machine, which was especially designed for participation in this year's international light-plane competition, but could not be finished in time (the machines entered were withdrawn at the last minute owing to alterations having become necessary). The machine is a low-wing monoplane, with wings of almost symmetrical camber, having slotted flaps and ailerons. The fuselage



A NEW TYPE AT THE D.E.L.A. : The Klemm Limousine four-seater is powered by an Argus engine.



THE KLEMM "POPULAR" : The Klemm L33, it will be seen, is a high-wing monoplane. It is fitted with a 15-18-h.p. D.K.W. engine, and will be marketed at 4,500 marks (approximately £300 at present rate of exchange).

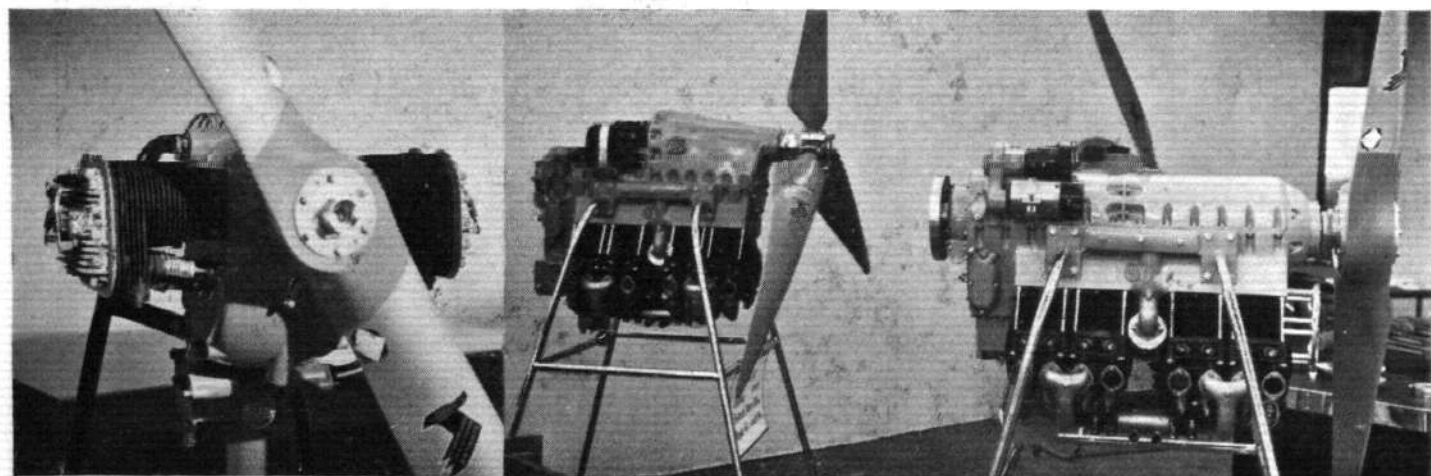
has a welded steel tube frame, and the wings have a single spar with veneer nose, and the rest fabric covered. The span is 36 ft. (11 m.), the area 47.57 sq. ft. (4.5 sq. m.) and the length of the machine 25.4 ft. (7.75 m.). Fitted with a 130-h.p. Argus engine, the maximum speed is 163 m.p.h. Touring speed with engine 15 per cent. throttled is 140 m.p.h., and the landing speed, with flaps down, as low as 34.1 m.p.h. The two seats are arranged one behind the other, and are covered by a glass hood, which can be opened in various ways and thrown off entirely if necessary.

Two German firms are making a bid for the "popular" market by offering machines at between 6,000 and 7,000 marks, including engines. These are Fieseler and the Gebrüder Müller of Griesheim, who have brought out a model called "Haller" after the man who proposed the design of this machine.

The Fieseler (illustrated last week) is a low-wing monoplane 19 ft. in length with two open cockpits in a fabric-covered steel-tube fuselage. The two wings, which are also fabric covered, are braced by profile wires to the top of

the fuselage and the rigid undercarriage. The wheels have no shock absorbers, but they are shod with large size low-pressure tyres. Wing span is 31.16 sq. ft. (9.5 m.) and the area 140 sq. ft. (13 sq. m.). The machine is equipped with a horizontal four-cylinder Argus engine (two cylinders on each side opposed) of 40 h.p. output and weighs 506 lb., this being also the load the machine is capable of carrying. The maximum speed is 90 m.p.h.

The G.M.G.-Haller machine looks unusually rugged and heavy, but, in fact, only weighs 660 lb. It is a shoulder-wing monoplane with two seats entirely within the wooden fuselage, easy access being vouchsafed by large door-like sliding windows in the sides. N-struts support the wing sections, which have a total span of 36 ft. and an area of 172.23 sq. ft. (16 sq. m.). Total length is 22.31 ft. (6.8 m.) and the maximum speed with a 60-h.p. BMW Xa radial engine having NACA cowling 100 m.p.h. and with the previously mentioned small Argus engine 90 m.p.h. The interior is spacious and well appointed. The wheels are fitted on a single axle suspended in forked struts. It is a simple, straightforward and serviceable design.

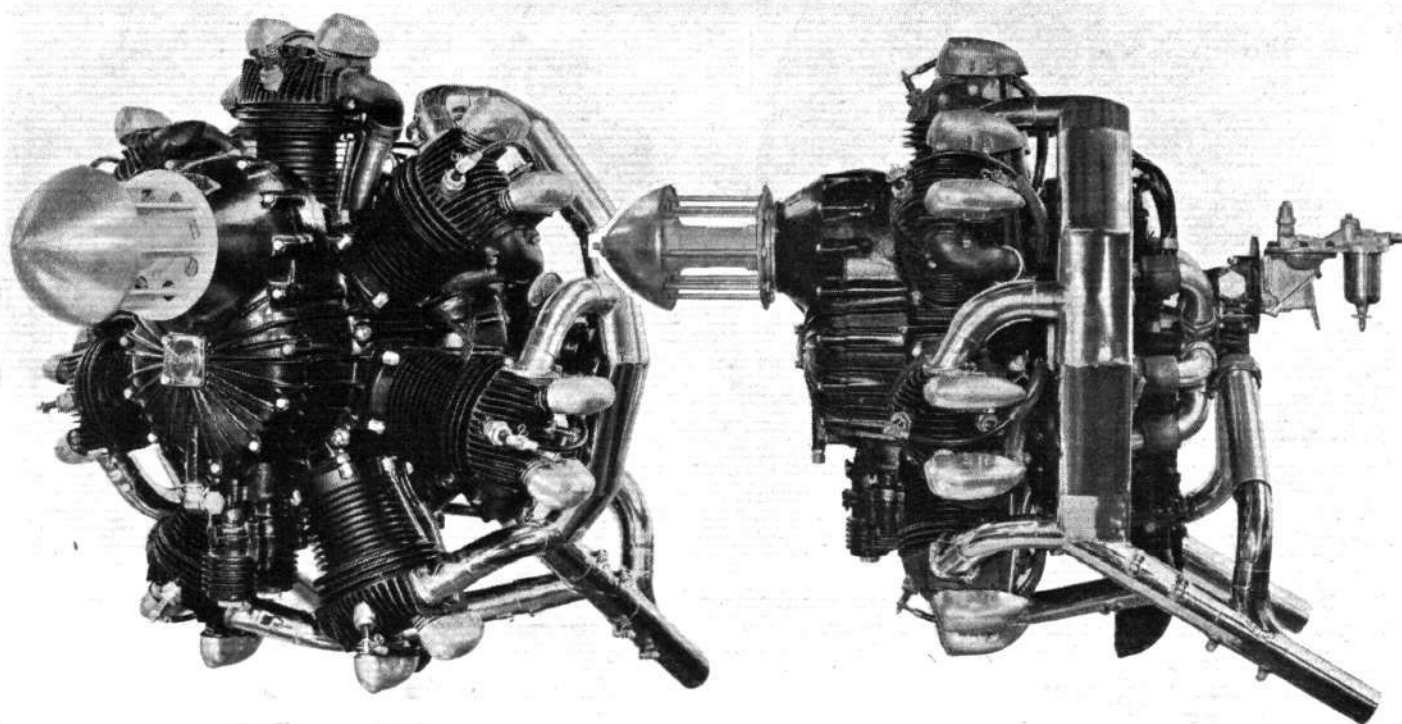


NEW ENGINES AT D.E.L.A. : On the left the Argus As 16 of 40 h.p. In the centre the new geared Hirth 150 U, and on the right the direct-drive Hirth 150.



The Pobjoy "R" Engine

Improvements in 1933 Model



THREE-QUARTER FRONT AND SIDE VIEWS: The general arrangement of the engine is well brought out.

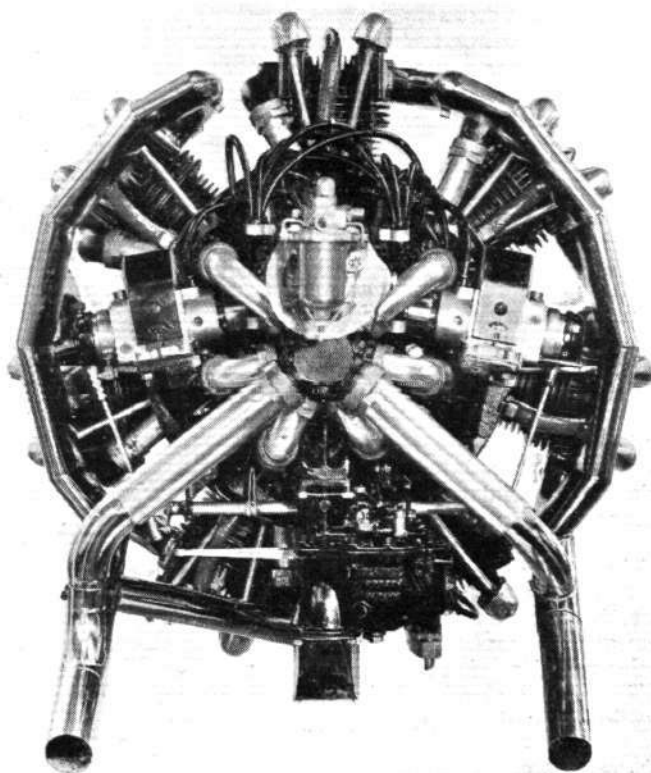
SINCE it was first put on the market in July, 1931, the Pobjoy "R" engine has rapidly attained popularity, not only at home but abroad. By way of example we may quote the fact that this engine has now been fitted in no less than 16 different makes of aeroplane, in countries like the Argentine, Austria, Czechoslovakia, Canada, France, Germany, Holland, India, Italy, Jugoslavia, Kenya, Spain, Tanganyika and the United States of America. Apart from several gruelling air races, in which it has acquitted itself nobly, the Pobjoy "R" engine has many long-distance flights to its credit, for a list of which we have not the space here, but which have already been recorded in *FLIGHT*. There can be little doubt that originally it was the very low weight and small overall size, with consequent low drag, which tempted designers to fit the Pobjoy. By themselves these features would not, however, have established the engine. Reliability and low maintenance costs play as great a part, or even greater with the user, as the other features do where the aircraft designer is concerned. And had these not been present, the Pobjoy engine would have had a shortlived popularity. So far from this being the case, an increasing number of aircraft designers are turning to Pobjoy Airmotors, Ltd., for their power plants, and this may be explained by the fact that the experience gained with the first dozen or so engines has been such that the company has felt justified in now recommending a new schedule of maintenance, by which the period between complete overhauls is 450 hr., valve clearances checked and push rods greased after 10 hr., oil and petrol filters cleaned after 25 hr., sparking plugs and magneto contact breaker points cleaned and adjusted after 50 hr., carburettor jets and float chamber cleaned after the same period, as also filling up the interior of rockers with grease. After 150 hr. the engine will require top overhaul, and another after 300 hr.

The 1933 Engine

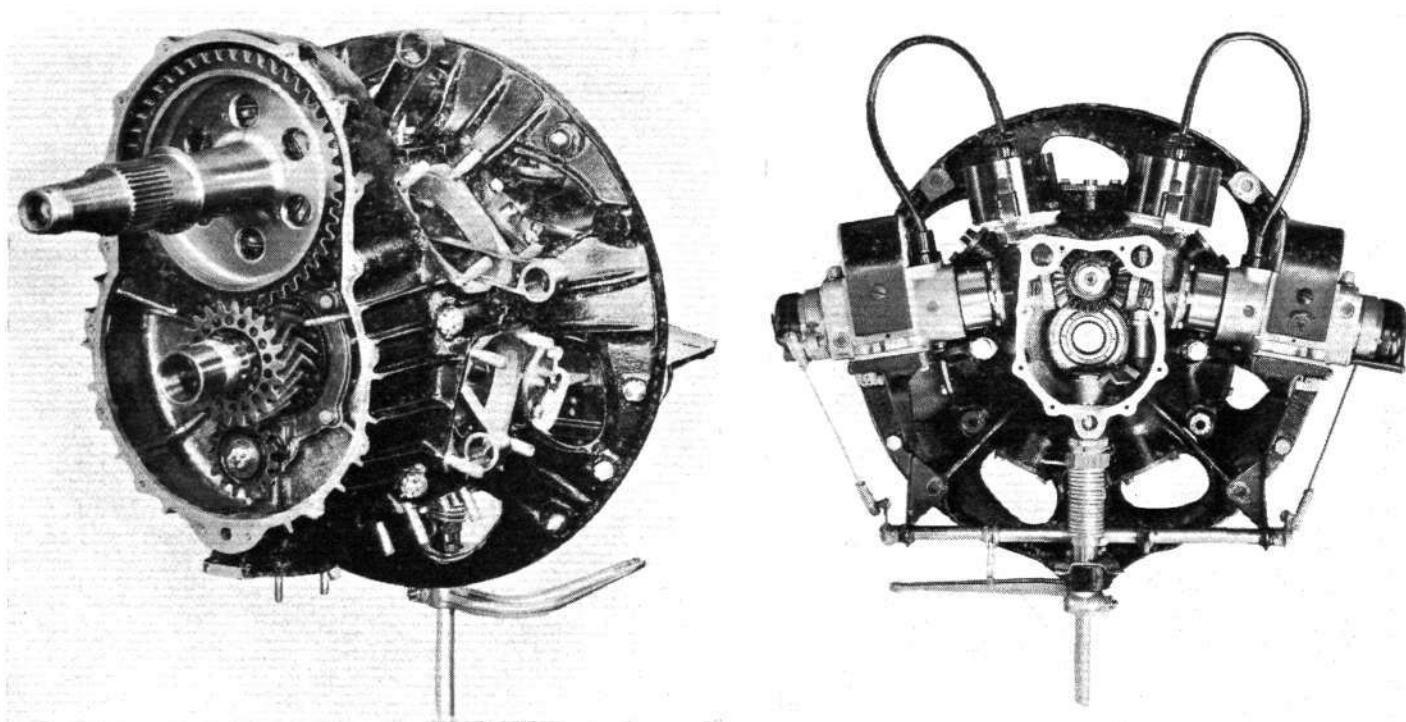
The 1933 model is of the same size and general characteristics as the previous model, but a number of detail refinements have been added. The rated power, 75 b.h.p. at 3,000 r.p.m. (1,400 r.p.m. airscrew), is the same as before, but on account of manufacturing improvements the normal power is usually between 78 and 80, rising to 85 maximum. The weight remains the same at 135 lb., plus 8 lb. for the exhaust system.

This engine, although one of the lightest in the world for its power, is very robust in all its parts, the low weight being entirely due to the small bulk of the engine.

The light alloy crankcase is in four parts, and carries the patented single-throw two-piece crankshaft on four substantial bearings. At the front end is a plain bearing through which the pressure oil reaches the crankshaft. On either side of the crankthrow are two large roller bearings, and the shaft is located endwise by the rear ball bearing.



REAR VIEW: Air intake, exhaust pipes, magnetos and carburettor may be seen. The petrol pump is placed centrally, above the inlet pipes.



THE POBJOY "R" ENGINE: On left the crankcase, with airscrew reduction gearing. Connecting rods can be seen projecting through the holes for the cylinders. On the right, the rear cover, with crankshaft, magneto drives and hand starter.

The single crankpin is hardened, and on it runs a floating bronze bush running inside the hardened eye of the master connecting rod, to which are linked the six articulated connecting rods by a patented arrangement.

The aluminium slipper-type pistons run in steel cylinders to which aluminium cylinder heads are screwed and locked by a patented method. Each head carries one inlet and one exhaust valve, actuated by ball-bearing rockers carried on patented brackets to avoid expansion troubles. The rockers are dustproof and self-lubricating, but grease-gun attachments are provided for replenishing the grease at infrequent intervals. Instantly detachable aluminium covers are provided over the rockers.

The reduction gear to the airscrew shaft consists of a pair of substantial double-helical gears. To serve the double purpose of steadying the drive and of centrifugally filtering the lubricating oil, a patented centrifugal or hollow filter-flywheel is secured to the crankshaft alongside its gear. This filter need only be cleaned at top overhaul.

The duplex oil pump mounted accessibly at the front of the engine scavenges the crankcase and returns the oil to the tank, whence it is drawn by the pressure pump and delivered at 35 lb. per sq. in. into the hollow crankshaft via the front cover. The big-end bearing and the cam-drum bearing are supplied under pressure, the remaining bearings being lubricated by splash. The inlets to the two pumps are protected by readily accessible gauze filters.

The two independent ignition systems each consist of a B.T.H. magneto firing its respective sparking plug in each cylinder via a separate H.T. distributor. Shielded ignition can be provided for use with radio.

The Claudel-Hobson carburetter is set for economy when cruising, but on fully opening the throttle a special power jet is brought into

operation. A mixture control is provided for use at altitudes.

The hand-starter mechanism, of the ratchet type, is completely disengaged when in the normal running position. Spring stops limiting its travel in both directions are provided inside the crankcase.

The exhaust collector system is specially designed to avoid expansion troubles, and is heavily chromium-plated all over. A control shutter is fitted to regulate, according to the climate, the heat supplied to the carburetter.

The petrol pump and its drive, fitted if required, sits neatly on a bracket at the extreme rear of the engine.

Engines are supplied, if required, with a special rear casing carrying a tail shaft driven by a ratchet clutch from the end of the crankshaft, and intended for the operation of Autogiro rotors, etc.

Special Features

A new pattern ball-bearing valve rocker is now used, having many times the life of the original pattern, and is practically indestructible.

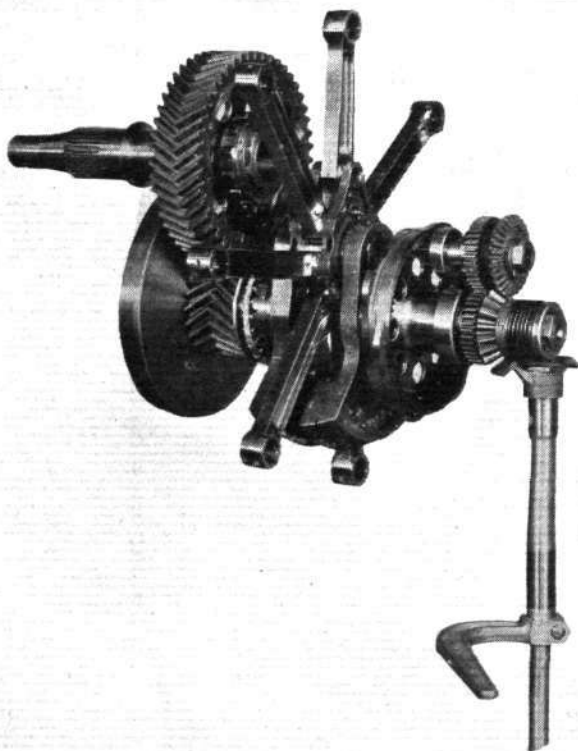
A new pattern of magneto coupling is now fitted which gives exceptional resiliency and flexibility, and yet cannot deteriorate or shear.

The H.T. distributors have improved ventilation, avoiding the danger of occasional shorting in hot weather.

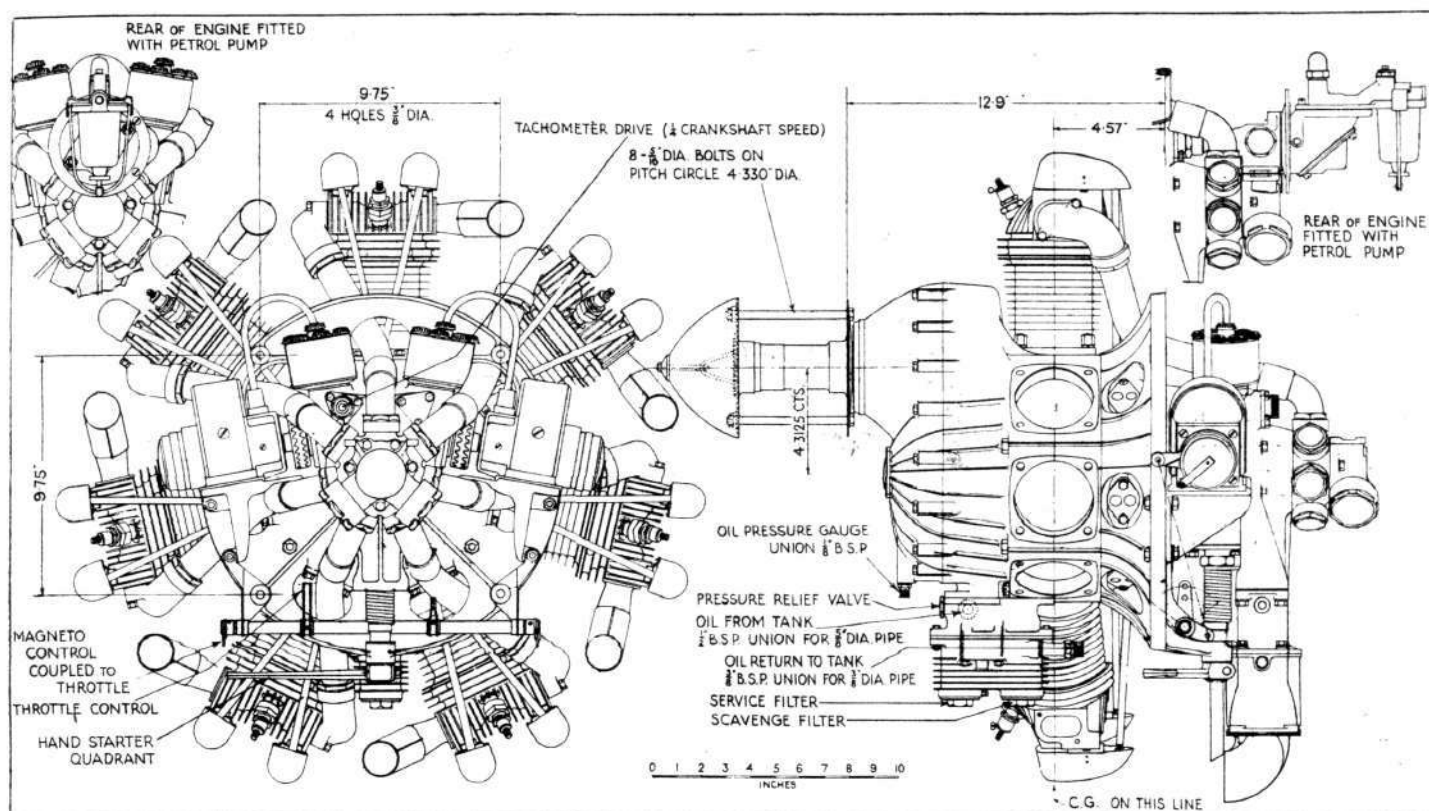
The engine is provided with hand-starting gear, which may be operated by cable from a hand-grip in the cabin or cockpit. It is *never* necessary to touch the airscrew, except if desired for "sucking in" purposes when cold.

A priming adaptor is fitted as standard in the induction manifold, for use if required with a priming pump. The adaptor is normally supplied unpierced; if required, it is made operative by passing a $\frac{1}{16}$ -in. drill through it.

As a result of intensive research work, heavy oil consumption and leakage has



Assembly of crankshaft, connecting rods, airscrew reduction gears, centrifuger, cam ring and hand starter.



THE POBJOY "R" ENGINE: Installation Diagram.

been definitely overcome, the oil consumption of the new engines being low per h.p., and the cleanliness exceptional. In addition, a lower cowling or tray has been developed, and is supplied fitted to all new engines, relieving the aircraft designer of the admittedly difficult task of cowl-ing the underside of a radial. In this way, oil is posi-tively prevented from appearing upon the sides and wings of the aeroplane.

SPECIFICATION

The following brief specification gives the main data relating to the Pobjoy "R" engine:

Type: 7-cylinder radial air-cooled. Geared. Dry sump.

Rotation: Left-hand tractor.

Bore: 77 mm. (3.08 in.).

Stroke: 87 mm. (3.48 in.).

Capacity: 2,835 c.c. (170 cu. in.).

Normal Power: 75 b.h.p. (rated); 77-79 (actual).

Normal speed: 3,000 r.p.m.

Maximum power: 85 b.h.p.

Maximum speed: 3,300 r.p.m.

Weight: 135-140 lb. (61.4-63.6 kg.).

Weight of Standard Exhaust Collector: 8 lb. (3.63 kg.).

Specific Fuel Consumption: At 0.9 throttle, 0.53 pints (0.32 litres) per h.p. per hour. At full throttle, 0.62 pint (0.35 litre) per h.p. per hour.

Fuel Consumption per Hour: At 0.9 throttle, 4.5 gallons (20.5 litres). At full throttle, 6 gallons (27.3 litres).

Oil Consumption: 1.25 pints (0.71 litre) per hour.

Oil Pressure: 30-40 lb./sq. in. (2.1-2.8 kg./cm.²).

Oil Temperature: Inlet, 50-70 deg. C.

Oil in Circulation: 6 pints (3.42 litres) minimum.

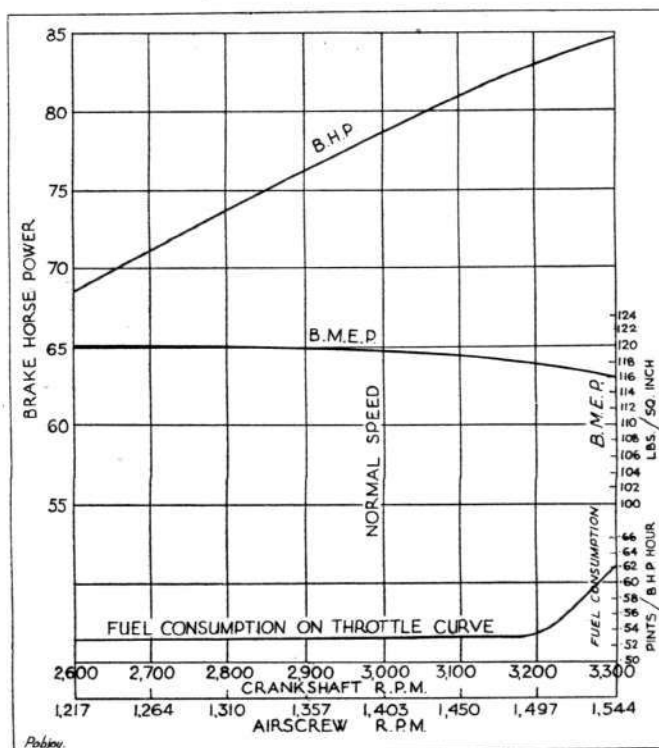
Valve Timing: Inlet opens 4 deg. early. Closes 50 deg. late. Exhaust opens 60 deg. early. Closes 11 deg. late.

Valve clearances (cold): Inlet and exhaust 0.002 in. (0.051 mm.).

A totally-enclosed cowling scheme has been developed, giving an extremely neat external appearance as well as improved cooling and reduced head resistance, and yet leaving the engine still exceptionally accessible.

All new engines will be provided with cowling support brackets at no extra cost.

As an example of how Pobjoy engines stand up to their work, we may quote the case of Mr. C. A. Butler's original Australia flight engine. When this engine was completely overhauled after 300 hr. running, the cost of replacements was only £8! Moreover, when the engine was put on the test-bench it developed 81 b.h.p. at 3,000 r.p.m. and 87 b.h.p. at 3,300 r.p.m., both of which exceed considerably the normal figures for new engines.



THE POBJOY "R" ENGINE: Power and consumption curves.

Air Transport

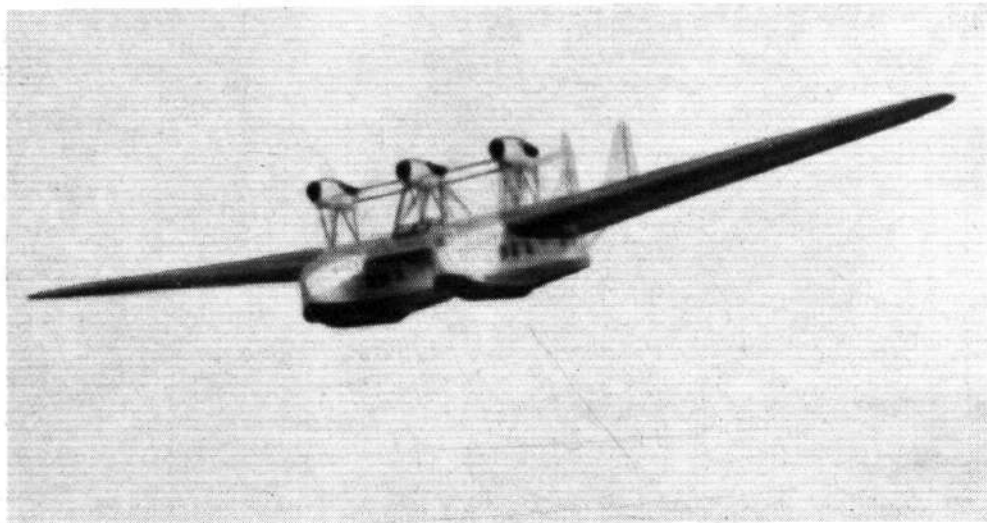
THE SAVOIA-MARCHETTI S.66

NO doubt most of our readers are familiar with the large Italian Savoia S.55 twin-hull monoplane (already described in *FLIGHT* on various occasions) which, amongst other accomplishments, were used on the famous "Formation" flight across the South Atlantic led by Gen. Balbo. The S.55 is a Service bombing or torpedo machine with two engines in tandem, and recently the Savoia-Marchetti firm have developed this type into a commercial version, with certain modifications and improvements, known as the S.66.

The S.66 is a tri-motor monoplane, with the double hull and tail outrigger arrangement of the S.55, of wood construction. The cantilever wings are of thick section, tapering towards the tips both in plan form and thickness; they are in three sections, a centre section which connects the two hulls and carries the three engine nacelles and the pilots' cockpit, and two outer sections set at a dihedral angle.

The wings are built up of three spars—a main central one and two secondary ones—and spruce ribs, the whole wing being covered with three-ply and divided into 54 watertight compartments. It is thus capable of providing considerable buoyancy in the event of a forced descent on the water with damaged hulls. The wings are treated with special damp-resisting composition and varnishes.

In the forward portion of the centre section is the pilots' cockpit, with two side-by-side seats, back-cushion Salvator parachutes, and dual control. The instrument board, with the engine controls below, is arranged in front of the seats. The pilots' cockpit communicates with the hulls, right and left, while a corridor, between the second and third centre-

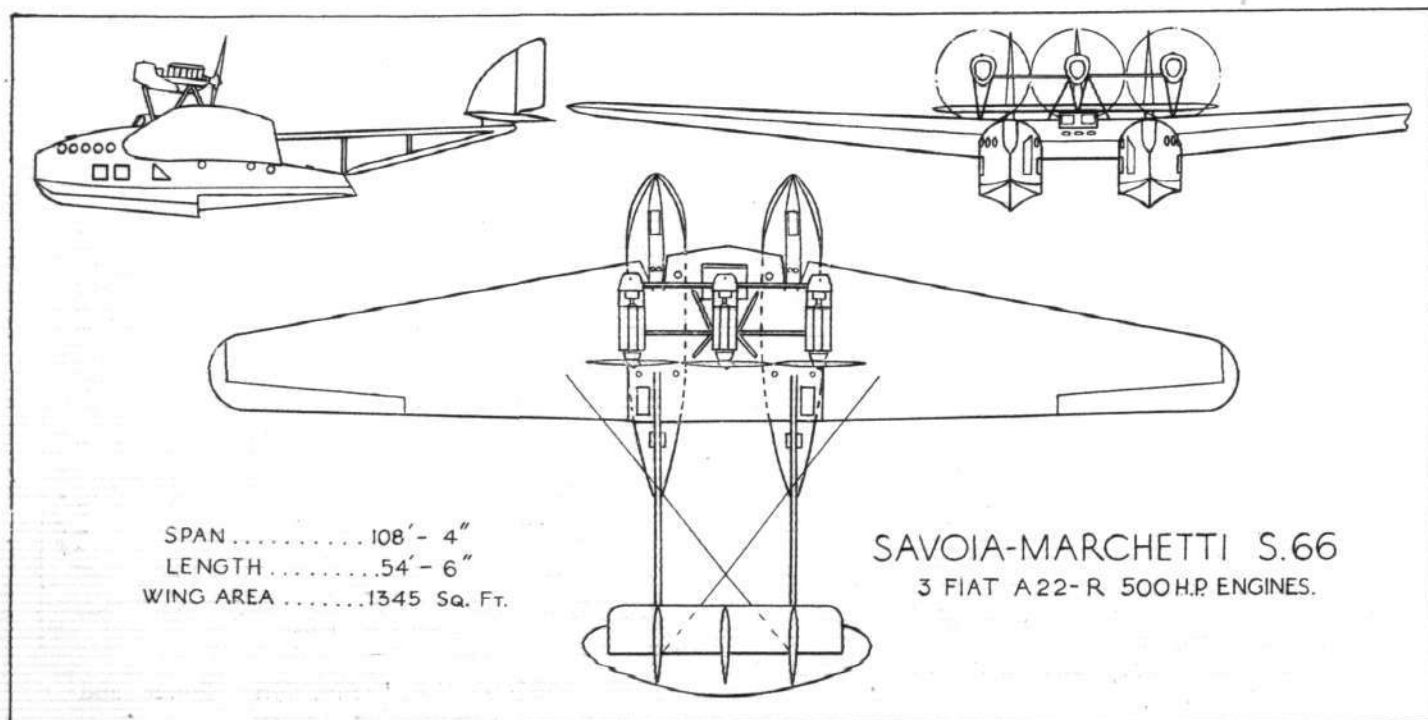


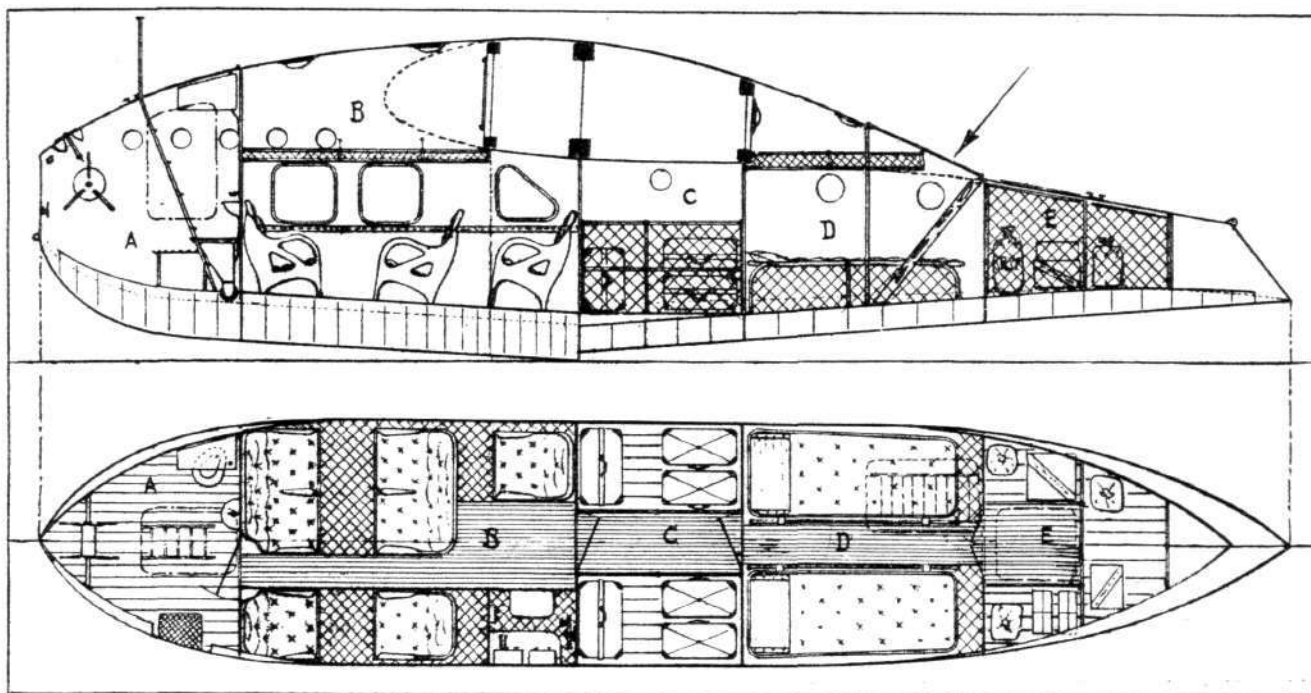
The Savoia-Marchetti S.66 twin-hull, three-engined monoplane in flight.

section wing spars, also connects the two hulls, enabling the mechanics to attend to the engines during flight—an opening being provided in the top surface of the centre section for this purpose.

The two hulls are also of wood construction—poplar, spruce and ash—with a covering of birch and double cedar planking with inner layers of proofed fabric below the water line. The hulls are able to remain moored in the water for long periods. The V-bottom is provided with a single step. Each hull is divided into five divisions; forward is a small compartment with a companion ladder leading from the top deck and an entrance to the main cabin; next is the main passenger cabin seating seven passengers in sprung armchairs; then comes the passengers' luggage compartment (and entrance to the centre-section wing); behind this is a compartment with two sleeping berths (folding) and another companion way to the top deck; finally, a compartment for freight and mails. The wireless station is located in the main passenger cabin.

Three 500-h.p. Fiat A.22R engines, with reduction gear and variable-pitch four-bladed metal propellers, are mounted in nacelles supported above the centre section





THE SAVOIA-MARCHETTI S.66 : Internal arrangement of one of the hulls. A = Forecastle and entrance to main cabin. B = Main passenger cabin. C = Passengers' luggage compartment. D = Sleeping berths and aft entrance. E = Freight and mail compartment.

by steel-strut cabanes, complete with water and oil-cooling radiators and motor-compressor for starting.

The tail surfaces are carried on two V outriggers, each attached to one of the hulls. The horizontal stabiliser is provided with variable-incidence gear, and the one-piece elevator is balanced; there are three vertical rudders located in the slipstream of the propellers.

In designing the S.66 special attention has been given to, apart from comfort and safety in the air, seaworthiness when on the water, and facility for repairs or replacements. As regards the latter, the various units of the machine may speedily be replaced; one of the hulls can be replaced in a day, or a wing unit, the complete tail,

engine nacelles can all be replaced in a matter of a few hours each.

The principal characteristics of the Savoia-Marchetti S.66 are:—Span, 33 m. (108 ft. 4 in.); O.A. length, 16.60 m. (54 ft. 6 in.); height, 4.90 m. (16 ft.); wing area, 125 sq. m. (1,345 sq. ft.); weight empty, 6,100 kg. (13,430 lb.); useful load, 3,000 kg. (6,600 lb.); total weight, 9,100 kg. (20,030 lb.); speed range, 95-235 k.p.h. (59-146 m.p.h.); range, 1,200 km. (745 miles); climb, 2,000 m. (6,560 ft.), 12 min; 3,000 m. (9,840 ft.), 22 min.; 4,000 m. (13,120 ft.), 37 min.; ceiling, three engines, 5,000 m. (16,400 ft.); two engines, 2,500 m. (8,200 ft.); take off in 30 sec. C. DE R.

The London-Galway Air Service

OUR Irish Correspondent reports that following a lengthy meeting of the Galway Harbour Board recently, at which the establishment of a London-Galway air service was discussed for some time, the ensuing statement was issued for publication:—"The Galway Harbour Commissioners have had under consideration for some time the establishment of an air service between Galway, Dublin and London. The establishment of an air passenger service in the Free State presents difficulties which are now being considered by the Free State Department of Industry and Commerce. Proposals have been submitted to the Galway Harbour Commissioners by the Iona National Airways, and they propose, when all the arrangements are complete and present technical difficulties surmounted, to put into operation on the Galway-London route a number of 20-seater three-engined cabin machines, similar to those in operation all over the Continent. The service will link up with passenger liners which now frequently make Galway a port of call, and by so doing they hope to be able to transport passengers to London or to different parts of the Continent. The air lines will also operate passenger tours throughout the Free State and to different watering places in England and the Continent. The saving of time in all cases will be considerable, and the selection of Galway as a terminal point will mean a very great advantage to Galway and the Irish Free State generally. The company will be controlled mainly by Irish capital, and will operate the air services with headquarters in the Free State. It will also enter into working agreements with other established lines in England and the Continent."

The statement seems to have cleared the air of a number of rumours that have been circulated regarding the Galway airport recently, and it would appear that some definite action has been taken at last. The Iona National Airways is a Dublin company operating air taxis and a training school at Finglas, a few miles from the city, but they are

not making any statement at the moment. It is stated on good authority in Dublin that this firm will co-operate with Royal Dutch Air Lines in the establishment of the service.

Extension of South African Air Mail

THE Postmaster-General announces that a weekly air mail service has been established between Broken Hill (Northern Rhodesia) and Elisabethville (Belgian Congo) connecting with the England-South Africa air mail. Correspondence for the Katanga Province of the Belgian Congo may now be sent by air from this country to Elisabethville, the time of transmission being 9 days. The inclusive air postage rate is 1s. 3d. per $\frac{1}{2}$ oz. for letters and 7d. for postcards; and the latest time of posting in the air mail box at the General Post Office, King Edward Street, London, E.C.1, is 11 a.m. on Wednesdays. Correspondence should be superscribed "by air to Elisabethville."

Air Mails to Madras

THE Postmaster-General announces that, commencing with the service which left London on October 8, the aeroplanes of the England-India air mail service connect at Karachi with the aeroplanes of an Indian air service which flies from Karachi to Madras via Ahmedabad, Bombay and Bellary. The inclusive postage rate for air mail correspondence for India and Ceylon intended for transmission by the new service is:—Letters, first half ounce, 8d.; each additional half ounce, 7d.; postcards, 4d., that is, the same as for correspondence for transmission by air to Delhi. Correspondence prepaid at these rates should reach Bombay on Saturday and Madras on Sunday, two days in advance of correspondence prepaid for transmission by air to Karachi only. Air mail correspondence for India and Ceylon intended for transmission by air beyond Karachi should be superscribed "by air in India."



NEARLY "TAKING-OFF": Rain and wind almost beat the members of the Maidstone Aero Club who were organising the display which was billed for Saturday at Gillingham. The flying programme was abandoned but lunch was not, as their persistent efforts soon got the marquee picketed down firmly. (FLIGHT Photo.)

WATERING THE "GARDEN OF ENGLAND"

THE County of Kent is called the "Garden of England," so naturally it has to be watered, but it does seem a bit hard that the heavens should choose October 8, the day of the Medway Towns' Air Rally, to discharge their liquid contents over that part of the country. It was not as if they—the heavens—did it in a cheerful or even reasonable manner; they didn't; they just emptied buckets and buckets, and then accompanied libations with a gale which threatened every minute to blow away everything on Star Field Aerodrome at Gillingham. The marquee, wherein the disconsolate pilots and both the spectators hoped eventually to obtain bodily refreshment, was several times within an ace of collapse from the combined weight of wind and water, and had it not been for the heroic work of the A.A. Air Squad, then there would certainly have been some casualties among the visiting aircraft.

An arrival competition was billed for 12.15 p.m., but even the most optimistic hardly expected anyone to arrive for it. Four pilots got through the execrable weather, which goes to prove the wisdom of a highly-placed R.A.F. officer who recently told us that whenever he wanted to know the best route for getting through

really bad weather over any particular piece of country, he always got hold of a private owner and learnt about it from him. Almost dead on time, Flt. Lt. J. B. Allen arrived in the Duchess of Bedford's "Puss Moth" (Gipsy III); closely following came Mr. W. M. Wood on an "Avian," the same which belonged to Miss Winifred Brown when she won the King's Cup in 1930, and not many seconds afterwards came Mr. Jackaman, in his resplendent "Monospar." We doubt if we have ever heard anyone quite so "flat out" for the merits of his craft as is Mr. Jackaman, and its "Cellon" finish is certainly very fine. Mr. Bentley, in the Shell-Mex-B.P. "Swift," a "Bluebird" and a "Moth" belonging to those who had hoped to do some joyriding, completed the aerial visitors.

Notwithstanding the unfortunate weather conditions, the machines were judged for the *Concours d'Elegance*, Mr. Jackaman, with his "Monospar," gaining first prize; Flt. Lt. Allen, with the Duchess of Bedford's "Puss Moth," incidentally a particularly well-kept example of this machine, secured second prize; and Mr. Wood, on the "Avian," third. The catering staff engaged to provide lunch, were naturally somewhat disconcerted by the



THE A.A. HOLD ON: Sterling work was done by the A.A. Air Squad in securing the aeroplanes from the force of the elements. (FLIGHT Photo.)

combined effects of the gale and the torrential downpour, but nevertheless they eventually managed to get their food laid out, and the visitors were soon gratefully turning their attention to this. The rest of the meeting had to be cancelled, which was very unfortunate, particularly so as every item of the organisation seemed to have materialised. The A.A. squad were there, fire, ambulance, and everything else all turned up, but naturally in the circumstances there was no hope of carrying through any flying programme. We ourselves were fortunate enough to be comfortably transported in one of the new "Fords," not the 5A.T. three-engined aeroplane, but the more mundane 14.9-h.p. 1933 model motor-car. These cars are really extraordinarily good value, and provide excellent comfort with a really good performance. A steady cruising speed of 55 m.p.h. can be maintained with great ease, while the synchro-mesh gear makes gear changing a pleasure. From the dry and comfortable position inside this car our photographer was able to obtain one or two photographs, and after the meeting was definitely "washed out," we took the road on to Gravesend aerodrome. This new aerodrome, as it will be remembered,

was formerly opened on August 25, and quite considerable advance has been made since then. The farm buildings, which were already on the site, have been cleaned and furnished, and now form quite comfortable looking quarters for the staff. The large barn is being extended and, when finished, will form an excellent hangar. The aerodrome itself is not yet down to grass, but the stubble is well consolidated and firm enough for all light aircraft. It has always been a boast of those interested in this undertaking that Gravesend has a far higher percentage of fine days than anywhere in the surrounding country. We were therefore not surprised to find that we had left the bad weather behind us by the time we arrived there, and when standing on the aerodrome, which is 250 ft. above the river, we seemed to be in a small island of fine weather. The approaches to the aerodrome are excellent, with practically no obstructions on any of its sides. Pupils are already going there for instruction, and being as it is, within easy access of both Chatham and London, the management are quite hopeful that they will very shortly have more than sufficient work for their staff to cope with.

FROM THE CLUBS

BROOKLANDS

A high number of flying hours is still being maintained at Brooklands, the times for last week totalling 50 hr. The College of Aeronautical Engineering Aero Club has sent another pupil, Mr. Poland, solo, which brings the number of their solo members up to ten, a very good record for the short time they have been operating. As the club members do their own maintenance under the Brooklands engineers they naturally show enthusiasm for the job, and their machine is beautifully kept. A new scheme of instruction has been started for youngsters, and the Walton troop of boy scouts attended the aerodrome for their opening lesson on October 4. The complete course will last some weeks, and it is hoped that properly organised troops of air scouts may result. Of the Brooklands Aero Club members, several are now using their machines for trips abroad. Mr. Van Marken has been to Copenhagen, Mr. Vaughan is leaving for South America and will fly his machine about the country when he arrives the other side, Mrs. Markham is shortly leaving on her flight to Africa, as is Miss Sale Barker; Mr. Bartlett is on his way to Nyassaland, Mr. Ahlers has recently made several trips to the continent, and Mr. Nelson has recently returned after an extensive trip in Spain on business.

NOTTINGHAM

On October 2 Col. Sheldine, the Director of Civil Aviation, flew to the aerodrome from Bristol and presented the *Nottingham Journal* Efficiency Flying Cup to Mr. E. Donald Wynn, of Derby, who won the competition for the second year in succession. The final was held on Friday morning between Mr. Wynn, Mr. H. C. A. Whitby and Mr. E. F. Winsor. The cup was presented at a luncheon given by the President of the Nottingham Flying Club (Councillor W. W. Weldon), and held in the clubhouse at Tollerton aerodrome. The Lord Mayor (Alderman W. Green), the Sheriff (Councillor Mrs. Harper), Alderman Sir Bernard Wright, Alderman H. Boles, Lt. Col. Dawes and Sqd. Ldr. Anderson (Commanding No. 504 County of Nottingham Bomber Squadron) were among the guests present. After lunch Mr. Francis Granger gave a display on his "Archaeopteryx," that interesting tailless monoplane which was

described and illustrated in *FLIGHT* for October 31, 1930.

AT YEADON

The wintery weather has greatly hindered flying at Yeadon during September, and on far too many occasions, operations have been impossible owing to the gales and thick mist. Mr. Garnett and Mr. Hay, two club members, have recently been to Biarritz for a holiday, while many other members have made extended flights both in this country and abroad. The air race from Yeadon to Newton House Hotel, which was reported in *FLIGHT* for September 16 was a triumph for the club, as all three winners were flying club machines.

AT KUALA LUMPUR

Lt. Com. G. A. Hall, of the Royal Australian Navy, who left Croydon on August 8 for Melbourne to rejoin his ship, arrived at Kuala Lumpur aerodrome, Federated Malay States, on Wednesday evening, August 24. His arrival had more than ordinary interest for the club, as for three days he had been searching the coast of Lower Burma and the mountainous districts for any sign of the two planter members of the club, Messrs. G. W. Salt and F. B. Taylor, who, leaving Moulmein on August 12 in continuation of



THE "THATCHED-HOUSE": This attractive-looking building at Kuala Lumpur Aerodrome houses two of the Club's "Moths" and the bar. Lt. Com. Hall, R.A.N., is on the right in the foreground.

their flight home, afterwards completely disappeared.

Com. Hall was absolutely convinced that, had they been forced down anywhere near the coast, where the mud banks are visible at low tide, he would have seen some sign of the plane or its wreckage; he also considered that had they come down in the hills he would have stood a very sporting chance of seeing them. His own opinion was that they had come down in deep water, and it was extremely unlikely that they could be alive; he only abandoned the search because he was certain that further air search would be useless.

When Com. Hall arrived at Kuala Lumpur the club was able to give him some engineering assistance. His machine is a Blackburn "Bluebird," the second side-by-side seat having been converted into a spare petrol tank. The engine is a Cirrus-Hermes of 115 h.p.; after the 1,000 mile hop from Alor Star it was given a general inspection. Com. Hall left Kuala Lumpur on the 26th for Singapore, and reached Wyndham, Australia, on September 1, the last sea portion of his flight having been successfully flown.

MAIDSTONE AERO CLUB

On Sunday, October 16, the club are organising a Motor Gymkhana on behalf of the Rochester and Chatham Motor Club. No charge is being made for the events, and anyone may enter on the field. On Friday, October 21, the club are holding their autumn dance. Tickets which may be obtained at the club-house, and include supper, are 10s. 6d. double and 6s. single. Three members, Messrs. Garnar, Waldron and Lathbury, have recently obtained their "A" licences. An excellent little folder has recently been prepared, which gives full particulars of all the facilities to be found at the West Malling aerodrome (Maidstone Airport), at which the club operates. This includes a plan showing the proposed extension and very elaborate country club which it is hoped will be started upon shortly. Anyone who is interested in flying in this part of the country should write to the club for a copy.



PENSIVE RECAPITULATION: Lt. Com. Hall, R.A.N. (centre), telling the K.L. Club members of his unsuccessful search for Messrs. Salt and Taylor along the coast of Lower Burma.



SEEN FROM A "SHELL" AEROPLANE: The winner of the Mildura (Victoria) Aerial Derby, Australia. The pilot of the Victoria Aero Club "Moth" is Mr. H. Hughes.

READING

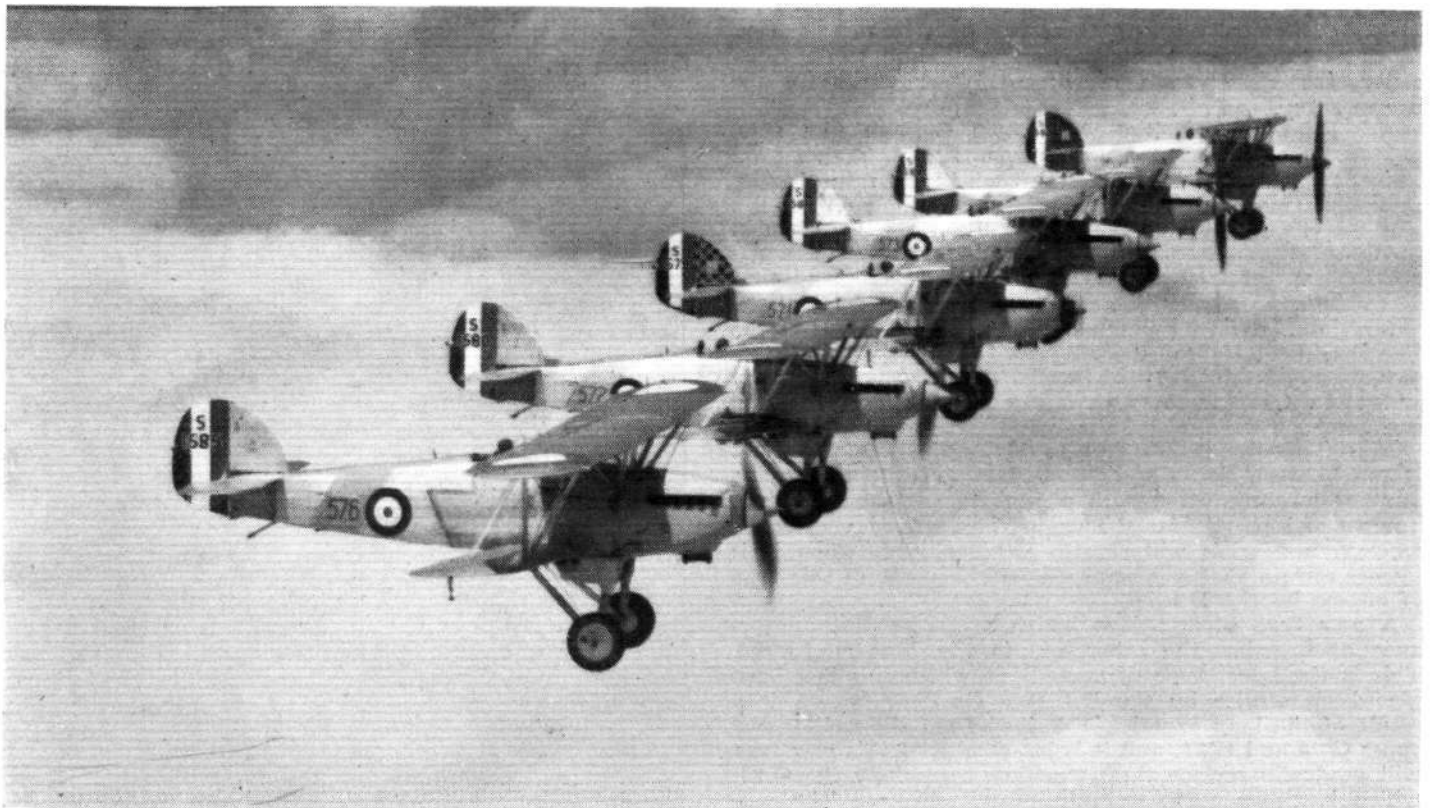
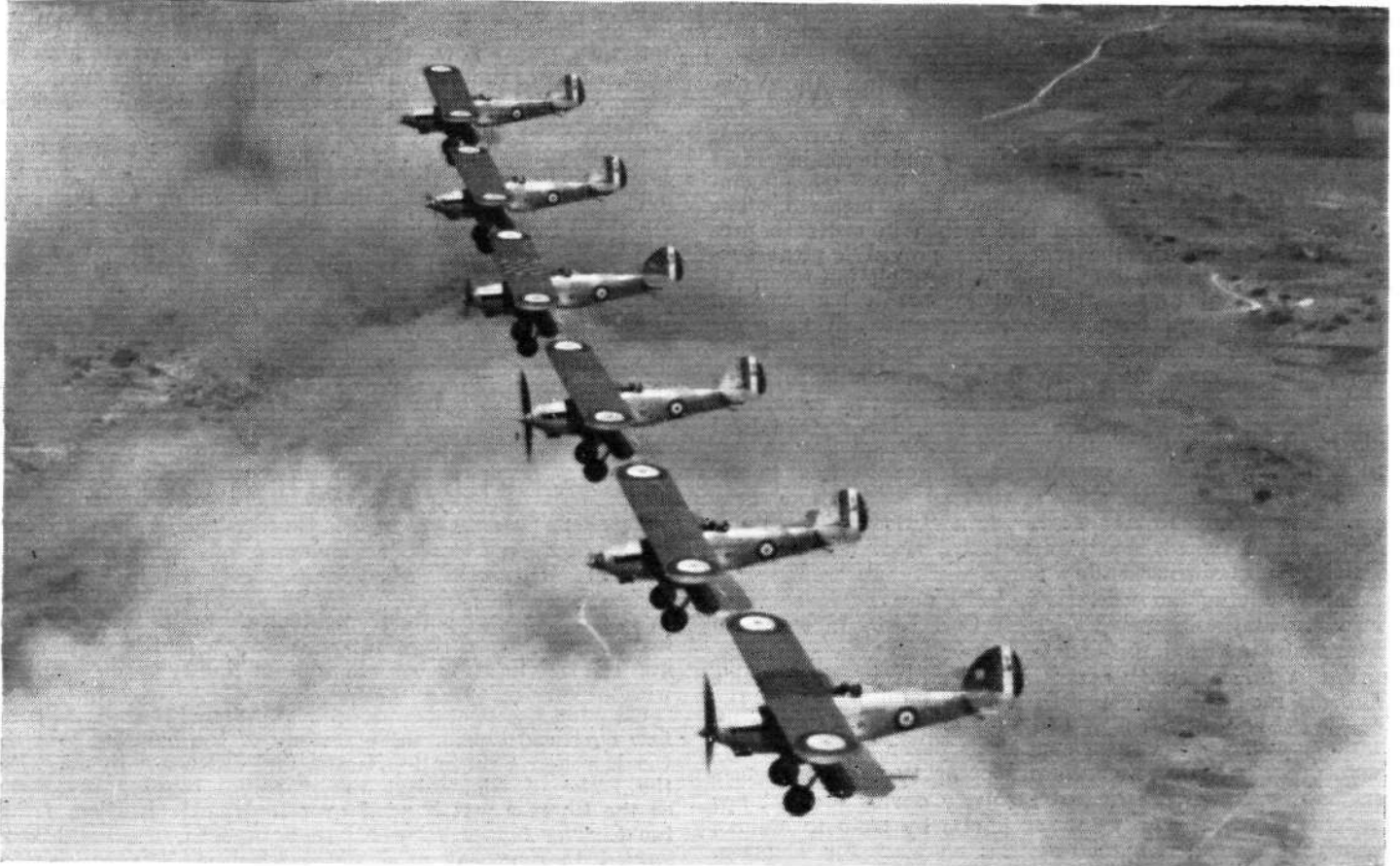
The club was very busy during the week-end, as the bad weather which seriously affected flying in most parts of the country avoided them in a gratifying manner. Several members made long cross country trips, including Mr. Bremridge, who flew to the Isle of Wight; Mrs. Heclass, who chartered the "Desoutter" for a trip to Portsmouth, and Mr. Bishop, who flew one of the club "Moths" to the same destination. Mr. Cliff's trip to Düsseldorf, which was reported in *FLIGHT* last week, has borne good fruit, as the "Civilian Coupé" which he took out, has now been sold in that country. Recent sales include a "Spartan," which is being used in connection with big game hunting in Africa, and a "Klemm" sold to Mr. Forsyth. It is worth noting that anyone who joins the club at this time of year can do so for a half-subscription, as the club year ends on March 25. Among the many visitors during the week-end was Maj. Allen, who owns a particularly beautiful looking "Puss Moth," which he keeps at his own private aerodrome at Ifley, near Oxford. The Miles "Satyr" has been flown a great deal, and certainly draws favourable comment from everyone who sees it. Mr. Miles now has an office at Reading, and is said to be very busy on a new machine; its advent will be awaited with interest.

NEWCASTLE-ON-TYNE

Those who may intend visiting Cramlington aerodrome and the Newcastle-on-Tyne Aero Club, should note that the club will be closed for staff holidays from October 17 to November 1. The aerodrome, however, will of course, be open with the usual refuelling arrangements for visiting aircraft. Despite difficult weather conditions the flying time for the period ending September 30 is well above that of the corresponding period last year. The last Cirrus II "Moth" belonging to the club has now been replaced by another "Moth," with the more powerful Gipsy I engine. Four "A" licences were obtained during September, two being by members from overseas, Mr. Dey of India, and Mr. Watt from Egypt. Mr. Caldwell successfully passed all the tests and obtained his "B" licence during August. The Comper "Swift" which has been at the aerodrome for some time past has proved very popular indeed, and has been flown by a great number of the pilots. The second hotel in N.E. England to arrange their own landing ground is the Otterburn Hall Hotel, near Carter Bar, within 35 min. flying time of Cramlington. The landing ground is in an excellent position close to the hotel, and it is expected that this will make a very good aerodrome.



Fighters of the Fleet Air Arm



R.A.F. Official Photo.]

[Crown Copyright

*R*ARELY have we had the privilege of publishing photographs of such perfect formation flying as that depicted above. They show No. 408 Fleet Fighter Flight, of H.M.S. "Glorious," commanded by Lt.-Com. E. M. C. Abel-Smith, R.N. The aircraft are Hawker "Nimrod" fitted with Rolls-Royce "Kestrel" engines

Airport News

CROYDON

DURING the week two pupils of British Air Transport, Ltd., were awarded their "A" licences, and two successful night flights were carried out. The school is rapidly growing and becoming more popular. Capt. Penny states that they have more members and are busier than at any time hitherto. The coffee stall which he opened last month in order to provide refreshments for the school has proved a great success, and is patronised from early morning until late at night. A good and well-cooked meal can be obtained there, and visitors from other aerodromes will be made very welcome at Addington.

Mr. Low and Mr. Taylor, both pupils of Rollason, Muir and Rickard, obtained their "A" licences this week, and Mr. Wright, a pupil of the same firm, having obtained his "A" licence some time ago, has ordered a "Bristol Fighter" for his own use, which is being assembled in the workshop of Rollason, Muir & Rickard, and is now near completion. Mr. Robert T. Boyd, a "B" licence pupil of the same school, has just returned from a fortnight's aerial tour in Switzerland.

Surrey Flying Services, Ltd., have now made arrangements with the Redwing Aircraft Co., Ltd., to carry on part of their school work at Gatwick.

The "Fox Moth" aeroplane which won the King's Cup air race this year has been loaned by S.F.S. to the de Havilland Aircraft Co., Ltd., for experimental purposes and particularly for some special propeller tests.

Press photographs of the Prince of Wales and Prince George have been despatched regularly during the last few days as late as 9 p.m. from Stockholm by train to Malmö, and then transferred to the Scandinavian Air Express, reaching Croydon at 3.30 the following afternoon. It would appear from this that, with the general speeding up of the regular air services, there will be a loss of business to those firms that specialise in private hire work, especially the conveyance of urgent photographs for the newspapers.

Mr. Fritz Schultz, the well-known German film star, paid a flying visit to London from Berlin, arriving on Thursday afternoon in the "Rohrbach," and returning by the same machine on Saturday morning. Mr. Schultz had an engagement to appear on the stage in Dresden the same evening. Immediately upon arrival at Tempelhof he stepped into a specially chartered aeroplane that was waiting to convey him at top speed to his destination.

Mr. Jahn, the very popular manager at Croydon of the Deutsche Luft Hansa, reports that there is a considerable increase in the quantity of inward freight from Germany, and often there is more than the night freight machine can carry.

A trial service is being operated by the Deutsche Luft Hansa between Berlin and Amsterdam with a single-engine Junkers machine fitted with a Junkers Diesel-engine type Jumo 600 h.p. So far the engine has proved very satisfactory, and trials will shortly be concluded, when it is almost certain that a general use will be made of this type of engine by the D.L.H.

A new type of aeroplane which made its first appearance at Croydon the other day is the Junkers J.U.52. This is the latest type of monoplane which has just been placed on service by the D.L.H. Its development is a result of the long experience derived from the well-known types G.24 and G.31, and it is intended that this new type will gradually replace these machines, especially the G.24, which has now completed ten years' service. The outstanding features of the J.U.52 are an enormous pay load combined with an exceptional high speed and climb. Fifteen passengers and three crew are carried in this machine, which has a maximum pay load of 3½ tons, a top speed of approximately 155 m.p.h., a cruising speed of approximately 145 m.p.h. and a very low landing speed of only 45 m.p.h. Two of these machines, as a result of their unrivalled performance, have been placed on the Munich to Rome service across the Alps, and it is quite probable at a later date the same type will operate on the Amsterdam-Croydon service. It was this machine that won the Chavez-Bider Cup which was recently competed

for at Zürich. These Junkers J.U.52 machines, I am informed, are now the fastest multi-engined aircraft engaged in commercial aviation, and still further modifications are to be made in this type, so that later versions will be even speedier.

A letter was received by Cirrus-Hermes Engineering Co., Ltd., on Monday, October 10, from Lt. Com. Hall, R.A.N. This was the first communication regarding his flight to Australia apart from a short telegram previously received. Lt. Com. Hall states that the engine could not have given him less anxiety. The total flying time of his flight from Croydon-Perth, W.A., was 159 hr. 25 min., which included 13½ hr. spent at Rangoon searching for the missing airmen, Messrs. Salt and Taylor.

A number of Hermes II engines are in course of production and these will shortly be despatched to the Far East.

The total number of passengers for the week was 1,688; freight, 60 tons 3 cwt. "HORATIUS."

FROM HESTON

THE usefulness of the flood lighting installed at Heston was demonstrated on Sunday evening, October 2, when Mr. Armstrong, of Iona Airways, Ltd., arrived in a "Fox Moth" after dusk from Ireland without previous warning. Hearing the machine circling overhead, it was only a matter of switching on the light to enable him to land with ease and without any delay.

On Monday, October 3, a flight from Heston Airport flew overhead during the ceremony of the handing over of the Borough Charter to Heston and Isleworth by H.R.H. the Duke of Gloucester, the machines dipping in salute as the Charter was handed over to Mr. H. J. Nias, J.P., the Charter Mayor. By a happy thought, the flight was formed to represent professional aviation, private owners and lady pilots, one "Moth" from Airworks School of Flying being piloted by Capt. G. W. Ferguson (representing the instructional side of aviation), Mr. R. P. G. Denman in his "Puss Moth" (representing private



HESTON'S NEW MAYOR: Mr. H. J. Nias, the Charter Mayor of Heston and Isleworth, who made an official flight at Heston Aerodrome during the air rally held on September 8 to wind up the civic celebrations.

owners), and Miss Susan Slade in her "Moth" (representing lady pilots).

Airwork School of Flying had an urgent charter to Paris late in the afternoon, with one passenger. Piloted by Mr. Weedon, the journey in the "Puss Moth" occupied only 2 hr. 18 min. Customs clearances were:—One to Amsterdam, one to Paris, two to Ireland, one from Flushing. Two others started on the return journey, but one landed at St. Ingelvert and one at Lympne. The two to Ireland were Mr. Armstrong, of Iona Airways, and Hillmans' "Puss Moth," to Dublin in connection with the Irish Sweep proceedings.

Tuesday, October 4, favoured us with a nice flying day, and another of Airwork School of Flying pupils carried out his first solo—after many disappointments owing to weather. Two new pupils joined the school to-day and took their first lesson. Mr. Weedon returned from Paris with Airwork, Ltd. "Puss Moth," and later in the day two passengers were taken to Wallingford. The "Puss Moth" of Hillmans cleared Customs on returning from Ireland with pictures of the mixing of the Irish Sweep tickets. Lady Simon arrived by air at Heston from Geneva.

Banco's "Puss Moth" left at 7.5 a.m. on Wednesday, October 5, for St. Ingelvert to pick up a passenger, arriving back at Heston at 9.15 a.m. A Lockheed "Vega" cleared for Dublin with four passengers and Herr Van Derlaux with a "Puss Moth" for Rotterdam. Although a dull day, visibility was good, and Airwork School of Flying had no vacant time all the day. The School "Puss Moth" was engaged running the popular trip to the Windsor district. Col. Bitossi, the Italian Air Attaché, and Senor Mameli, Consul-General for Italy, were visitors to Heston to-day.

On Thursday, October 6, Banco took a passenger to Paris in their "Puss Moth." A Hillman's "Puss Moth" left for Dublin. Another new pupil commenced instruction with Airwork School of Flying.

At the invitation of Wills, Ltd., the tobacco manufacturers, a small party set off for Bristol about noon to make a tour of the factory. Mr. Jack Armour took a "busman's holiday," flying a "Puss Moth" with Mr. Vogt, Managing Director of Meyrowitz, Ltd., as passenger, and Mr. Brian Allen, of Henly's, Ltd., in a three-seater Spartan with Mr. De Loriel and another as passengers. The tour proved so interesting that the party only arrived back at Heston just before lighting-up time. This type of visit seems to open up possibilities to manufacturers to

invite parties from different airports to visit their works by air.

Customs clearances were:—One "Puss Moth" to Cologne; one "Puss Moth" to Paris; one "Puss Moth" to Dublin; one "Moth" from Berlin; Lockheed "Vega" from Dublin.

Friday, October 7, presented quite good flying weather, although gusty wind, and only experienced pupils were able to fly solo. Banco's "Puss Moth" arrived back from Paris, taking only 1 hr. 45 min. on the journey. Arrangements have been made by Airwork, Ltd., for "B" licence flying instruction, which includes 100 hr. solo flying, all necessary night flying, etc., to be offered by Airwork School of Flying at an inclusive charge of £200. Brian Lewis & Co., of Heston Airport, are re-equipping the Scottish Flying Club with four Gipsy III "Moths."

Saturday morning, October 8, after showing one or two slight glimpses of the sun, settled down to a steady rain, and it appeared impossible for the Charter Air Pageant to be held. However, just before 2 p.m. it cleared up, and when Mr. H. J. Nias, the Charter Mayor of Heston and Isleworth took the air, piloted by Capt. V. H. Baker, the clouds had lifted, wind dropped, and weather conditions in general so improved that it was possible for the pageant to proceed under pleasant conditions.

After looping the loop, the Charter Mayor fired off a Verey light, denoting the opening of the pageant. This was the signal for the aeroplanes on show, to the number of 16, to take off in mass formation.

The pageant was well supported, just on 3,000 paying for admission, while a large number of Club members attended. One of the popular items was the pylon race, won by Mr. Styran, of Banco, on their Comper "Swift," the steep banking at the turns causing many thrills, while the formation flying of 604 Squadron was much admired.

Included in the machines on show was the "Puss Moth" of H.R.H. The Prince of Wales, which drew large crowds. The public were given the free run of the airport, and the interest and knowledge shown, especially by the younger element, was surprising.

At the end of the pageant Mr. Nias expressed his thanks to the Directors of Airwork, Ltd., for their public spirit in holding the show, and stated that the officials of the newly constituted Borough would be pleased to reciprocate when opportunity offered.

On Sunday afternoon, October 9, Miss Margery Durant arrived in her Sikorsky NC-11 V from Paris.



Gold Reefs Located from the Air

It is reported from St. Johns, Newfoundland, that a large mineralised zone containing gold in massive quartz and sulphide reefs, silver, copper, lead, zinc, iron and mica has been discovered in the hinterland of Labrador by Capt. D. Bondurant, an American aviator.

To Those Flying Near Dagenham

ANYONE expecting to fly anywhere near Dagenham should, before doing so, make themselves acquainted with the contents of Notice to Airmen, Series A, No. 56, of 1932, which gives full particulars of the high towers which

have been erected to carry high-tension cables across the Thames at that place, because these are now completed and the cables erected.

Radio Masts Obstruction Lighting

AIR MINISTRY Notice to Airmen, Series A, No. 63, of 1932, gives information that the obstruction lights on the undermentioned radio masts are being lighted daily for a period of 3 hr. after sunset from October 1:—Brentwood, Brookmans Park (Potters Bar), Chelmsford (North), Chelmsford (South), Daventry, Falkirk, Horsea, Kidbrooke, Leafield, Ongar (North Weald), Rugby, St. Albans.



A FRENCH RECORD BREAKER: The Breguet type 19-8 Observation plane (660 h.p. Gnome-Rhone "Mistral Major" K-14) on which Capt. Signorin recently established two records, viz., 10,400 m. (34,120 ft.) with 500 kg. and 9,400 m. (30,841 ft.) with 1,000 kg.

Airisms from the Four Winds

Our Flying Princes

ON October 5 the Prince of Wales and Prince George flew from Stockholm to Korsnäs, in the Gävle timber districts in North Sweden, to visit the big sawmill and ironworks there. Weather conditions were far from ideal, the journey being made through heavy snow and rain storms. The Princes, accompanied by the Crown Prince of Sweden, Sir Godfrey Thomas, the British Minister, and Mrs. Clark-Kerr, flew in a three-engined Junkers seaplane, *Södermanland*, of the Aerotransport Co., piloted by Capt. Ernst Roll. They were escorted by three other seaplanes in charge of Capt. Tornberg. The return flight to Stockholm was accomplished later in the day under much better weather conditions. The Princes were due to leave Sweden by air for England on October 12.

Von Gronau Forced Down

HERR VON GRONAU, the German airman who is making a world flight in a Junkers seaplane, was forced down into the sea, by engine trouble, off the coast of Burma on October 10. He was picked up with his companions by the British seamer *Karagola*, which took his machine in tow.

Grierson Back in England

MR. JOHN GRIERSON, who recently flew to Moscow and Somarkand, arrived at Brooklands on October 5, having thus completed a flight of some 8,750 miles. Mr. Grierson stated that his experiences in Russia were not particularly pleasant, for he was in trouble with the authorities all the time and the food he had was by no means good.

Another World Flight

By the time this week's issue of *FLIGHT* reaches its readers, Mr. Arthur Loew, Vice-President in charge of the foreign department of the Loew Theater Corporation and Metro-Goldwyn-Mayer Studios, and his pilot, Capt. James Dickson, should have reached Melbourne, Australia, on the first overland hop of an around-the-world-in-eighty-days business trip they are making. The object of Mr. Loew's flight is the strengthening of relations by personal contact with foreign distributors of M.G.M. pictures. He will pick up and set down business associates along the way. The aeroplane Capt. James Dickson is piloting is the *Spirit of Fun*, owned by Hal Roach, of Hal Roach Studios, which has already flown through Mexico and Central America, and early this year made a 16,500-miles round trip to South America in 95 hr. flying time, at an average cruising speed of 174 m.p.h. In June of this year the same aeroplane broke the transcontinental passenger-carrying record in a 14 hr. 49 min. trip from New York to Los Angeles. It is a standard Lockheed "Orion" model, with retractable landing gear and has 160 gallons petrol and 12 gallons oil capacity. On September 23 the "Orion" left the Clover Field Airport and flew to Wilmington (Los Angeles), landing in a street of that town and taxiing towards the steamship docks. From there it was put on board the s.s. *Monterey*, of the Matson Line, and fastened down on the top shuffleboard deck for the crossing to Sydney, Australia, where the present globe-encircling flight actually commenced. If the schedule planned is adhered to, Mr. Loew and Capt. Dickson will reach their starting point in just about the 80 days deemed so preposterous for a world tour in Jules Verne's time. The itinerary of the *Spirit of Fun* will be as follows:—

Sept. 23, leave Los Angeles aboard S.S. *Monterey*, of Matson Line; Oct. 13, arrive Sydney, Australia; Oct. 15, Melbourne, Australia; Oct. 16, Adelaide, Australia; Oct. 17, Alice Springs and Wyndham, Australia; Oct. 18, Kupang, Surabaya, Dutch East Indies; Oct. 19-20, Batavia, Java; Oct. 21, Singapore; Oct. 22, Penang and Bangdon; Oct. 23, Hanoi, French Indo-China, and Hong Kong; Oct. 24, Shanghai, plane will remain here while Mr. Loew visits Japan; Oct. 31, Hong Kong; Nov. 1, Hanoi; Nov. 2, Mandaya, Burma, and Calcutta, India; Nov. 4, Agra and Bombay; Nov. 6, Karachi, and Jask, Persia; Nov. 7, Basra and Baghdad, Iraq; Nov. 8, Jerusalem, and Assuan, Egypt; Nov. 9, Khartoum, Anglo-Egyptian Sudan; Nov. 10, Kenya Colony and Tanganyika Territory; Nov. 11, Salisbury, Southern Rhodesia, and Johannesburg; Nov. 14, Capetown; Nov. 20, Cairo, Egypt (via above route); Nov. 21, Athens; Nov. 22, Rome; Nov. 23, Madrid; Nov. 24, Paris; Nov. 26, London; Nov. 30, sail from Le Havre for New York on board S.S. *Ile de France*, of Compagnie Generale Transatlantique.

The Altitude Record

It is announced by the Royal Aero Club that the Fédération Aéronautique Internationale has recognised as the world's altitude record for aeroplanes the flight made

by Mr. C. F. Uwins on a Vickers "Vespa" biplane (supercharged Bristol "Pegasus" engine) on September 16. He then reached a height of 13,404 metres (43,976 ft.). The previous record, set up in the United States, was 43,100 ft.

Lord Londonderry, Secretary of State for Air, has sent the following message to Mr. C. F. Uwins, of the Bristol Aeroplane Co., Ltd., on his successful attempt to break the aeroplane altitude record:—"On behalf of Air Council I send warm congratulations on winning the aeroplane height record for Great Britain, which has now been confirmed by the Fédération Aéronautique Internationale. Your success is a tribute alike to your own skill and the efficiency of the British aircraft and engine used."

French Air Scandal

A GREAT sensation has been caused in France by charges brought by M. André Bouilloux-Lafont, a former director of the Aeropostale Company, against M. Emmanuel Chaumié, Director of Civil Aviation, and M. Paul Louis Weiller, a director of the Gnome-Rhone Company. The charge was made that the majority of the shares in the Gnome-Rhone Company were sold to the German Lufthansa, and that the official had been bribed to agree to the transaction. M. Chaumié has been declared to be exonerated of the charge. The charge was based on some documents, which have since been declared to be forgeries. In consequence two men named Lucien Collin and J. de Lubersac have been arrested.

A Privately Owned Seaplane

ANYTHING new in the way of privately owned aircraft is always of interest, and this is particularly so in the case of the machine owned by Mr. C. W. T. Guthrie, son of the late Sir James Guthrie, the famous portrait painter and president of the Scottish Academy. This machine, which was recently delivered to him by Capt. R. H. Stocken, the well-known test pilot and aeronautical consultant, is a "Moth" (Gipsy I), fitted with metal floats manufactured by Short Bros. During the trip up from the south, Capt. Stocken had to land, owing to bad weather, at Felixstowe, Hornsea Mere and Blyth. He found as a general rule that no facilities were as yet available for privately owned seaplanes, but Hornsea Mere is an exception, as this was used by the R.N.A.S. during the war. Should any other users of seaplanes wish to alight there they are asked to obtain permission in the first place from Mr. Holmes, Kirkholme Boat House, Hornsea (Hornsea 23). There is good anchorage, and both petrol and oil can be obtained. At Blyth, the King's Harbour Master, Capt. Wilkinson, was found to be very helpful, while the Shell-Mex & B.P. representative did all that was necessary in the way of fuel service. If landing at Blyth, the pilot would be well advised to telephone the company's representative beforehand, as in the present case a misunderstanding caused the preparation of a 2,000-gallon tanker to supply the 10 gallons of petrol which were required! Mr. Guthrie lives at Row, on the Gare Loch, where he has built his own hangar and slipway, and a short stay with him, during which a great deal of flying was done, convinced Capt. Stocken that a light seaplane such as this is an ideal means of seeing to the full the beauty of the Scottish scenery. After his experience with this craft he is of the opinion that some form of pusher machine, or at least one where the aircrew is not directly in front of the machine near the floats is necessary, and that it should also have a self-starter, water rudders, special protection from corrosion and be designed so that picking up moorings is an easy job.

Indian Air Force

THE *Government of India Gazette* says that the Indian Air Force Act became operative on October 8, when "the Governor-General is pleased to establish an Indian Air Force, and direct that the said force shall consist of such corps and units as may hereafter be constituted by order of the Government of India, and for purposes of command, control, and discipline shall be placed under the control of the Air Officer Commanding His Majesty's Air Forces in India."

AIR NAVIGATION

THE first lecture of the session at the Royal Aeronautical Society, given by Capt. Norman Macmillan, M.C., A.F.C., A.F.R.Ae.S., on October 6, was very well attended. Capt. F. Tymms, M.C., took the chair in the absence of Mr. C. R. Fairey, who had been called away owing to the serious illness of a relative. Capt. Tymms, who is Director of Civil Aviation in India, is home for a short time, and, in introducing the lecturer, said that Capt. Macmillan was so well known to all present that a lengthy introduction would be quite superfluous. On the morning of the day before, Capt. Macmillan was in Oslo, but he had flown home to give them his lecture in person.

Capt. Macmillan said that the study of air navigation required both theory and practice. Study was necessary to acquire a knowledge of the theory, while facility and speed could only be gained by hours spent in the air. Theoretical navigation was simple enough. The art lay in being what sailors call weather wise in the actual practice of pilotage, and that was where practice counted. Most civil pilots were, in their profession, most akin to bridge officers of the Mercantile Marine.

After referring to the graticule of meridians and parallels, Capt. Macmillan said that as nature had not provided a corresponding graticule on the earth itself, the air pilot-navigator must make shift with such landmarks as existed equally upon the map and the landscape. The best natural landmarks were composed of woods, water and hills, while the best artificial landmarks were railways and roads. For flying over mountainous country it would be useful to the pilot if oblique photographs or isometric projection charts could be introduced in the margin of maps.

Most pilots who lost their way did so because they became agitated about the non-arrival of the next landmark as early as they expected. They became impatient, searched their map for another landmark near where they imagined themselves to be, found a good-looking one to right or left, turned off their course to discover it, failed, and were lost. When flying on a compass course a pilot should never lose heart if the clock seemed to be getting the better of the compass. Let him keep on, and if his landmark did not turn up let him search for and find another before he changed course. It was an axiom that a pilot should never alter course unless he knew his position.

Concerning long-distance flights, Capt. Macmillan said that the constant-bearing course, although a little longer than the great-circle and rhumb-line course, was the only practicable one in many cases, unless the aircraft carried an expert navigator who had no other duties to attend to. When flying on a constant-bearing course, the pilot needed to consider only one other thing—drift. Drift was really the most important factor in pilot navigation on a long-distance flight.

The only satisfactory maps were those drawn on the Mercator projection. Any straight line drawn thereon was a rhumb line, which gave the compass course except for magnetic variation and deviation. The scale of longitude was constant, but the scale of latitude increased outwards from the equator. Since maps on the Mercator projection were based on the Equator, they were not of use for navigation in the vicinity of the Poles.

The Mercator projection was the basis of practically all marine charts, and was also the best basis for aeronautical maps. It was not available for use near the Poles, but if the Polar routes were opened in the future by means of aircraft, he saw no reason why Polar charts should not be constructed on the Mercator projection, using an arc of a meridian passing through the pole as the unit base in the same way that the Equator was now used.

Capt. Macmillan paid a tribute to the navigation regularly practised by the Fleet Air Arm, the machines of which left the aircraft carrier and made reconnaissance flights. Most likely the machines were required to fly to a certain spot, make observations from there over a given area involving the change of course several times, and at the conclusion of the reconnaissance a return flight to the carrier, which in the interval had probably changed its position, being made along a course known before the aircraft left the deck. This was a very different problem from that of straight-line flight, and he thought it was unjust

that the very difficult work carried on by the Fleet Air Arm was practically never heard of by the general public. The lives and safety of the crew depended entirely on navigation. There were no landmarks. There were only the indicated speed and height, the course, the track and the clock, the observer's course-setting compass, drift gauges, a course and distance calculator, the chart board, and the wireless operator. Often the visibility on the return journey was very poor, and he had heard of cases when the ship was not seen until the aircraft was almost over her. Aerial navigation of this sort was as intricate a piece of work as any called for on the part of the air navigator. It required exactness, patience, swiftness and, above all, practice.

Astronomical Navigation

Turning to the question of astronomical navigation, Capt. Macmillan said the altitude of a celestial body was the elevation of the body measured from the angle of the horizon towards the zenith. The difficulty of poor horizon and of height of flight had made astronomical navigation from aircraft more difficult than from sea, added to which the increased speed of aircraft had made the problem of the time required one of the utmost importance. It was desirable, therefore, to employ methods which reduced the work of manipulation to a minimum.

The main requirements for astronomical navigation were a sextant with which to measure the altitude of the heavenly body; second, a nautical almanack; third, a reliable chronometer; and fourth, a book of the necessary conversion tables and, possibly, a Bygrave slide-rule for rapid calculations.

Astronomical observations were only a check on navigation to ensure that the dead-reckoning course was being maintained. All calculations which could be made on the ground before flight should be made. By working out in advance the assumed course, speed and relative positions, together with the observations which might be expected to be required and their calculations, references to books of tables would be eliminated as far as possible when in flight.

The best book of tables for rapid astronomical navigation which the lecturer had come across was an American publication published by the Hydrographic Office of the U.S. Navy. Its title was H.O. No. 208, Navigation Tables for Mariners and Aviators, by Lt. Com. J. Y. Dreisenstok, of the United States Navy. The book could be purchased by anyone for 75 cents. Only one other book, the Nautical Almanack, was required to solve rapidly all navigation problems.

The compass was the heart of navigation. It was the duty of every pilot and navigator to know that his compass was well positioned, so that he could read it easily under all conditions, that it was not interfered with by local attraction in the aircraft, that it was swung at regular periods if used over the same routes, that it was swung after changes in locality, that it was swung after heavy landings, and that any compensation was made with the minimum number of corrector magnets so that the directive force was not rendered unnecessarily sluggish.

Drift was the great enemy of the compass. Faults of variation and deviation had been got over by making corrections to the compass reading to allow for them, and if it were not for meteorological conditions nothing more would be required of the pilot to make a straight-line flight to any part of the earth. Of meteorological enemies, fog was the greatest, for although blind flying instruments had been developed to a stage where the pilot need not fear to fly through fog, yet there were still three main evils to be overcome: the absence of a height indicator which showed the actual height above the territory flown over; the possibility of ice formation on the wings; and the difficulty of making harbourage.

Drift was the angular relation between the course and the track. When one was flying over country with plenty of landmarks and in conditions of reasonable visibility, it was easy enough to check drift and to compensate for it. Above regular air routes wind strength and direction were measured and reported at regular intervals, and if the pilot was equipped with wireless, he could obtain reports during flight, but above the wilder spaces of the earth's

surface this service was not available, and the pilot navigator was forced back on his own resources. Indications of ground wind were not of much value, as it was affected by local disturbances. Moreover, the ground wind was rarely of the same direction as the wind blowing at 1,500 ft. When the ground was observable the pilot could obtain a very good indication by direct observation. He could also check wind direction and force by changing course and measuring and plotting his resultant speeds in three directions. If a navigator was carried he could measure the drift angle by means of a bearing plate or by sights over the tail on some distinctive object in the landscape. Under a clear sky he could maintain correct direction by sights of sun and stars. When flying over the sea the direction of the wind could be judged from the line of spume blown by the wind from the running waves. When buried in thick clouds, shut in from all sight of earth, sea or sky, the pilot could do no more than continue on the course he flew when first he entered them. Fortunately, in conditions of deep fog there was usually little wind, and drift could be discounted. There was one help in the worst conditions—wireless. No long-distance flight was properly equipped without that aid to navigation.

In the present-day training of a pilot blind flying was essential. The essential additional instruments were the turn and bank indicator and the fore and aft inclinometer. Any all-weather pilot was certain to have to fly blind sooner or later, and to-day every aircraft had to be fitted with the necessary instruments, and every pilot ought to be conversant with their use. He looked forward to the day when aircraft would be as completely equipped in their standard instrument board lay-out as was the modern motor car at a standard selling price.

In conclusion Capt. Macmillan said that there were many sides of the question of air navigation with which he had not been able to deal in the paper itself, but these would be dealt with in the further material which would appear in due course in the *Journal of the Royal Aeronautical Society*.

The Discussion

Before calling upon Mr. E. C. Gordon England to open the discussion, Captain Tymms said that it was a characteristic of Captain Macmillan that he never disappointed. He had lived up to his reputation in the lecture he had just delivered. Captain Tymms recalled that at one of his first meetings with the lecturer he (Capt. Tymms) was invited to join a somewhat mysterious expedition which was to do certain business within the three-mile limit of the coast of the United States. He declined the offer! Later on, as they knew, Captain Macmillan attempted a flight around the world, and came to grief in the Bay of Bengal, where he and his companion spent some very uncomfortable hours on the bottom of the floats of their capsized seaplane.

Referring to his own impressions of aviation in England after a long absence, Capt. Tymms said that flying in the Short "Scipio" and the Handley Page "Hannibal" classes, as he had done on his way home from India, was nothing short of a revelation. Not only was the general comfort of the passengers very much greater than formerly, but there was a complete change in the cockpits from the haphazard ways of old. Concerning the lecturer's suggestion, that oblique view of mountain ranges might be given in the margin of flying maps, he thought this might constitute a danger, since the skyline of a mountain range was constantly changing. The number of photographs which would have to be carried if the range was to be shown from all likely points of view would be enormous. He would like the lecturer to explain a little more fully his suggestion of a map on the Mercator projection for use in the polar regions.

Mr. E. C. Gordon England said he was sure the lecturer would not mind him referring first to the great pleasure which it gave them all to have in the chair that evening the Director of Civil Aviation in India. As a "has-been" in aviation (Mr. Gordon England was among the pioneer British pilot-designers), he was impressed, in looking back, at the enormous progress made, but he still thought that there was wonderful scope for improving the technique of air navigation. He was sorry the lecturer had not said more about the subject of landing in obscured weather conditions.

Mr. Collins pointed out that the constant-bearing course was not invariably between the great-circle course and the rhumb line course. He was sorry the lecturer had not stressed more the case of celestial navigation. When the large flying-boat was developed this form of navigation would be used much more. Navigation tables even more recent than those referred to by the lecturer had now been published. He was speaking from memory, but thought they were by Goodrich. He pointed out that the Bygrave slide rule performed the same function as tables, and might be rather handier. Like the chairman he also would like the lecturer to elaborate on his suggested

Mercator map for flying in polar regions. He agreed with the lecturer that maps would be improved by marginal insets of silhouettes of landmarks, etc., and mentioned that the International Commission for Air Navigation had recently decided to standardise stereographic projection for many air maps, in a form which would link up with those in the Mercator projection.

Commander L. C. Sharman, R.N., emphasised the effect of wind, and said the word should be printed in capital letters. The wind direction was liable to change during a patrol, and a check was wanted every half-hour. He referred to the relationship of wind and temperature. If the temperature was found to have changed, one could be sure the wind had also changed. It was a common fallacy that the view from altitude was much better than from near sea level. Usually there was a haze, and visibility was no better at height. One thing which was against spotting objects on the sea was that from an altitude they got no silhouette against the horizon.

Captain Fergusson did not agree with the lecturer that the theoretical side of navigation was simple. Astronomical navigation was more or less freak navigation, and he could not, somehow, quite see pilots of Imperial Airways get out their sextants! He thought it more likely that progress would be along the line of directional wireless in Morse code. He did not see why aircraft carriers should not carry directional wireless and thus facilitate the navigation of aircraft operating from it. The lecturer had referred to the need for an altimeter which indicated height over the terrain below. He was not interested in that, but he was interested in knowing that ahead of him was an obstacle like a wireless mast. He was afraid no instrument would tell him that.

Captain Rex Stocken pointed out that the Spanish Aero Club some time ago got out a set of maps with silhouettes in the margin. The silhouettes were quite good and useful, but the maps themselves were wrong!

Mr. A. J. Hughes (of Henry Hughes & Son, Ltd.) said that if one were to believe an article published in *Flight* recently, the compass was not fit to use. Actually, he thought the compass a very reliable and useful instrument, and was glad the lecturer had referred to it as "the heart of navigation." He also agreed that in navigation the proper thing to do was to hang on to one's compass course when the expected landmark did not turn up when it ought. He had recently crossed the North Sea from England to Bergen, and they just set their course and kept it. There was no question of uneasiness or of doubting the compass. In discussing recently the question of navigation with Mr. Gatti, the latter had recommended taking a rear bearing at the start of a flight.

Mr. Coupland, when asked for his views on the matter, said that he thoroughly agreed with the dictum of trusting to the compass, although it often seemed to do funny things, and incidentally, it usually did so.

Commander Sharman, speaking with reference to a previous speaker who had advocated the use of directional wireless beams from an aircraft carrier being used to assist the return of aircraft from a reconnaissance flight, said that in the Fleet Air Arm they certainly do use wireless as much as possible but the use of a directional beam had very serious disadvantages indeed. Not only might it conceivably break down and bring disaster to those who were relying on it, but also it could very easily be rendered useless in war time by "jamming" from the enemy.

Mr. Everitt (of Henry Hughes & Son), concerning the reference made by Capt. Macmillan to the tables compiled by Dreisenstok, said that in his opinion these were now superseded by a new compilation by another member of the U.S. Navy, Gringrich.

Dr. Thurston pleaded for a better general knowledge of the Stainforth course indicator.

Mr. Scott Hall said that in his book on his flight to the South Pole, Byrd described how he had attempted to use the sketches made by other explorers of the various mountain ranges in order to orientate his position, but he had found this almost impossible to do, as he did not know from what aspect the sketches had been made.

Reply

Capt. Macmillan, in reply, agreed that the isometric views of the mountain tops would be no good if the mountains themselves were constantly in the clouds, but it was his experience that as a general rule the tops were clear and it was just under these conditions that, in his opinion, such views would be of particular value. More so as he had usually found that the maps of very mountainous districts were mostly exceedingly inaccurate. In reply to the queries regarding his idea of a Mercator projection of the Polar regions, he said that his conception of this would be published in the *Journal*. It would be a special chart entirely for this reason, and for use when taking the shorter air routes made possible by flying over the Pole. They would be entirely a specialised job, he said, and would not fit other Mercator projections. He would like to maintain his contention that strictly speaking the pilot still had eight dimensions to contend with when flying in fog although these dimensions were naturally for the most part in the pilot's mind. Referring to the landings which had been made in the U.S. in fog, he said that a method of approach had been evolved which, though very costly, certainly seemed most effective. It enabled a pilot to approach the aerodrome at a safe height and then to glide down a safe path at a certain pre-determined safe gliding angle. Moreover, the method told him exactly when, to use an Americanism, to "cut the gun" and land. Such a method, however, would hardly, he thought, seem practicable for general development, and certainly not for intermediate landing grounds. What was wanted, he thought, was to develop a method of seeing through fog. Reverting to the question of flying along a rhumb line, a Great Circle course, or a course of constant bearing, he said that failure to alter course at the pre-determined intervals necessary when flying by either of the former, might very well lead to a total larger error in distance than that caused by flying along a course of constant bearing. In answer to Flt.-Lt. Fergusson, he said he did not think that the theory was particularly difficult, and that it was chiefly a matter of striking a balance between theory and practice. This he said, would be dealt with further in the *Journal*. He agreed that the error caused by drift is certainly decreased with the speed, but at the same time on long flights it was still a matter of great importance.

R 101 Memorial at Beauvais

THE first stone of a memorial to the 48 officers and men of the airship *R.101* who lost their lives in the disaster two years ago was laid on October 5 at Alonne, on the Paris-Calais road. The memorial is situated nearly a mile from the actual spot where *R.101* fell to earth. Lord Tyrrell, the British Ambassador, Air Vice-Marshal Dowding, Group Capt. Bone, and representatives of the French authorities were present.

R.Aë.S. Awards

THE following awards were made at the Council Meeting held on Tuesday, September 20, 1932:—

Silver Medal.—Señor Juan de la Cierwa, F.R.Aë.S., for

his work in connection with the development of the Autogiro.

Simms Gold Medal.—Mr. P. Salmon, M.I.Mech.E., M.I.A.E., for his paper and work on catapults.

Wakefield Gold Medal.—Mr. L. G. Frise, B.Sc., F.R.Aë.S., for his invention of the Frise aileron.

R.38 Memorial Prize.—Mr. D. H. Williams, B.Sc., A.F.R.Aë.S., and Mr. A. R. Collar, B.A., B.Sc., for their joint paper on "The Motion of an Airship under Certain Conditions."

Pilcher Memorial Prize.—Mr. F. W. Dowsett, Stud. R.Aë.S.I., for his paper on "The Design of Aeroplane Controls and Control Systems."

AIRCRAFT ENGINEERING TRAINING

WE have it constantly brought to our notice, that as a result of the increasing growth of aviation, large numbers of young men are looking to aircraft engineering for their livelihood. Hundreds of them wish to be become employees actively engaged on the construction or maintenance of aircraft, and turn to *FLIGHT* for advice about the aircraft factories, or how to study for Ground Engineers' licence examinations at one of the training schools. To answer all these enquiries takes a great deal of time, and we have, therefore, obtained from the various aircraft manufacturers the following information, which should serve to help embryo aircraft engineers. A word of warning is however necessary, for so many people seem to think that they have only to express a wish to be taken on as an apprentice in an aircraft works, to have all the Works Managers running out to welcome them with open arms. Unfortunately such is not the case. Aircraft engineering, like most other branches of industry, has been suffering from the recent lack of desire on the part of most people to spend their money, with the result that the amount of work they have on hand is small, and the number of vacancies is therefore, often few and far between. Those who intend to use any of the information tabulated below, would therefore, be well advised to write to the firm they have selected, before making any arrangements whatsoever, in order that they may ascertain whether or not that firm has any vacancy. There are undoubtedly openings for the properly trained man, and a lad who has been through any one of the recognised technical colleges, obtaining his ground engineers' licences under a properly organised scheme of training, may be reasonably certain, that he is better fitted than most for the job, and that preference will be given to him when vacancies in aircraft works for properly qualified men occur. Many however, have not the necessary capital to expend on the fees required for such a course of instruction, and they must therefore, go through the works as apprentices. Nowadays, however, they need not be afraid that they will not receive a good training, for the old days when apprentices were allowed to knock about the works just as they liked are gone.

In compiling this list no attempt has been made at arranging the firms in order of merit, and no distinction has been made between them; the order in which they are published, being solely dictated by question of space and make-up. It should be understood that we are not endeavouring to recommend any particular firm or school. We merely seek to point out what each firm or school has to offer, and leave our readers to make their own choice as to where they obtain their training.

FIRMS IN THIS WEEK'S ARTICLE

Armstrong Siddeley Motors
Armstrong-Whitworth Aircraft
Bristol Aircraft & Engines
Comper Aircraft
Gloster Aircraft
Napier Aero Engines
Phillips & Powis
Rollason, Muir & Rickard
Saunders-Roe Aircraft

ARMSTRONG-WHITWORTH

Sir W. G. Armstrong-Whitworth Aircraft, Ltd., Whitley, Coventry

ARMSTRONG-WHITWORTH are builders of many successful metal aircraft for both Service and civil use. Prominent among the former are the "Atlas," a two-seater day bomber and Army co-operation machine, and the "A.W. XVI," which is probably the fastest single-seater fighter in the world (at its operational height), using an air-cooled radial engine; while for many years both their earlier forms of the "Atlas," and the predecessor to the "A.W. XVI," the "Siskin," have also been used in large numbers in the R.A.F. at home and abroad. The most interesting of the recent productions of Armstrong-Whitworth is the new "Atalanta" class of civil aircraft, with four "Double Mongoose" engines, which is being used by Imperial Airways on the African route.

Their apprenticeship scheme is arranged for boys of between 15 and 17 years of age. They are not proposing to add to the number of their apprentices for some months. It commences with a period of general training, and then concludes with a special course decided for each pupil by the com-

pany. The company also insist on apprentices attending technical classes, the cost of which is borne by the apprentice. No special privileges are allowed, except that time will be given for attending these classes. The company reserves the right to discharge any apprentice who behaves in a disorderly or dishonest manner, or who indicates he has no aptitude for the trade. They are, at the end of the apprenticeship, prepared to use their very best efforts to provide employment for apprentices, provided that their ability warrants the company doing so. There is a standard rate of pay during apprenticeship ranging from 1½d. minimum and 2d. maximum in the first year, to 5½d. minimum and 7½d. maximum in the fifth year. To these rates should be added a weekly amount representing the current cost of living of from 4s. to 8s., according to the age of the apprentice. When an apprentice is engaged on a production section, he is not debarred from piece work and earning a weekly amount equal to the ordinary employee. Naturally a formal agreement has to be signed by the parents or guardian of the apprentice, and a similar agreement will be signed by the company. The general schedule is 12 months in the machine shop, 18 months in the fitting shop, 6 months on wing assembly, 4 months on fuselage assembly, 6 months on fuselage fitting-up, 4 months on machine erecting, 4 months in the running shed, and 6 months in the drawing office.

BRISTOL

The Bristol Aeroplane Co., Ltd., Filton, Bristol

THE BRISTOL AEROPLANE Co. is one of the original manufacturers of aircraft in the West of England. Their single-

seater fighter, the "Bulldog," is well-known as a particularly fine piece of all-metal aircraft construction. Besides aircraft, the firm also builds air-cooled radial aero engines, and their latest model, the "Pegasus," is already recognised as one of the leading engines of its type in the world. Its predecessor, the "Jupiter," is probably manufactured under licence in a greater number of foreign countries than any other engine, and is doing an immense amount of work in the hands of both Service and civilian users.

Their apprentices are chosen from many selected candidates and accepted on a five-year agreement, it being usual for one year to be spent in each department. During this time, one whole day each week is spent at Bristol University, and it is also compulsory for students to attend evening classes. The fees for these classes are paid by the company, and the apprentice is paid his time in addition. In certain cases indentures are signed, but if a lad is accepted as an apprentice, no difference is made in his training, whether indentured or not. Like many other firms, the number of applications received is very large indeed, while the number of vacancies is comparatively small.

SARO

Saunders-Roe, Ltd., East Cowes, Isle of Wight

SAUNDERS-ROE is a firm which, to a large extent, specialises in flying boats and amphibians. Their present range includes the well-known Saro "Cloud," "Windhover," and "Cutty Sark," besides various larger boats for Service use. In the majority of these, the hulls are proper boat hulls, built upon what one might call, ship-building lines, with "Alclad" plating and light-alloy frames, while the wing of the above amphibian boats is generally a plywood structure. These boats are used both for Service training and also for civilian ferry work in many parts of the world, and there is no doubt that the Empire, being separated as it is by large tracts of water, will naturally cause an increase in the number of boats used in coming years.

Their apprentices normally serve five years with an opportunity, during the last year, of entering the drawing office. Like many other firms, they stipulate that the apprentices should attend evening classes, while they have also arranged with the local authorities to conduct classes in aeronautics, the lecturers being members of the firm. Situated as the firm is, in the Isle of Wight, it is only natural that preference should fall upon local applicants, and those from the mainland are always advised to apply to other companies. It is the general feeling that boys would be better off obtaining real engineering experience in other branches while taking an aeronautical course at a recognised college, particularly so, as owing to the fluctuations of work in the aircraft trade, the number of staff it is possible to maintain also fluctuates considerably. For example, at the present time, Saunders-Roe have more applications than they have vacancies.

GLOSTER

The Gloster Aircraft Co., Ltd., Gloster Works, Hucclecote, Gloucestershire

THE GLOSTER AIRCRAFT CO. are well known for the success they have achieved with single-seater fighter aircraft, like the "Grebe" and "Gamecock," which were standardised in the R.A.F. for many years. Latterly they have produced the large twin-engined "Air Survey" machine, which has been doing such excellent work on photographic survey in Africa. They now specialise in metal construction, while their subsidiary company, the Steel Wing Co., Ltd., as its name implies, produces wings entirely built of steel, large numbers of which have been used on the standard general-purpose R.A.F. machine the Westland "Wapiti."

They take apprentices under a scheme whereby pupils are given a period of approximately six months in each department of the works, finishing up in the department in which they intend to specialise. Thus, for example should an apprentice wish to become a draughtsman, he would do six months in each of the following departments: fitting shop, machine shop, sheet metal shop, erecting shop, and then spend the rest of his time in the drawing office. Conversely, should he wish to become a skilled artisan, he would probably go first to the drawing office, and then after going through the other shops, finish up in whichever shop he desired. The company already have a long waiting list, and it is therefore impossible for them to fix up with any new apprentices for some time.

ROLLASON

Rollason, Muir & Rickard, Air Port of London, Croydon

ROLLASON, MUIR & RICKARD is a flying school and air-taxi concern, operating at Croydon and also at Ford Aerodrome, Yapton, near Bognor. They operate most of the ordinary light aircraft, including "Avros," "Moths," "Klemms," "Desoutters" and "Puss Moths," so that apprentices working with them would obtain not only a varied experience of machines, but also of engines, including Cirrus-Hermes, Gipsy, etc.

Their apprenticeship scheme consists of a training period of two years, both theoretical and practical instruction being given in their workshops, for which a premium in full of £50 is asked. The instruction is planned so that at the termination of this course the student is in a position to take his "A" and "C" ground engineers' licences should he wish to do so. All

instruction is of course, given by fully-qualified and licensed ground engineers, and there is ample opportunity for practical work on aircraft. In order that the instruction may be, as far as is possible an individual matter, the number of apprentices taking a course at any one time is limited to three. Of those at present with the company, two are shortly completing their course, so that there will be two vacancies before very long.

ARMSTRONG SIDDELEY

Armstrong Siddeley Motors, Ltd., Coventry

IN COVENTRY, ARMSTRONG-SIDDELEY aero engines are made alongside the well-known Armstrong-Siddeley cars. The range of engines which they make in these works varies from the little 85-h.p. "Genet" up to the "Leopard," developing somewhere about 800 h.p. They are all similar, in that they are radial air-cooled engines, and in many cases the parts are interchangeable between the various engines. Many interesting and unique constructional features are included in this series and one and all are widely used by our own R.A.F., the Air Forces of most other nations in the world, and by civilian aircraft operators in many countries.

Boys are accepted for apprenticeship either for a period of five years or three years, according to their age. Apprentices have to attend technical classes, and of course obey all the regulations of the department of the works in which they are working. They receive wages according to the length of time they have been at the works, and according to their age, and if engaged upon production are not debarred from piece work. Various courses are in operation, according to which department the apprentice is selected to specialise in. After the first few months, their capabilities being considered by the company, before the selection of the course is made.

NAPIER

D. Napier & Son, Ltd., Napier Motor Works, Acton, London, W.3

NAPIER aero engines are well known for the part they have played, not only in such trials as the Schneider Trophy Contest but also in the steady hard work imposed upon them by service in the R.A.F. The Napier "Lion," with its three banks of cylinders arranged in W form, has perhaps for many years been better known than any other water-cooled engine in general use in the Service.

At the present time, they have a very full complement of apprentices, and state that there is no prospect of any openings for a considerable time. They carry out the usual system of trade apprenticeship as operated in the majority of engineering shops, but have no definite scheme of special training whereby apprentices can obtain ground engineers' licences on their particular engines.

PHILLIPS & POWIS

Phillips & Powis Aircraft (Reading), Ltd., Woodley, Reading

PHILLIPS & POWIS have a flying school at Reading aerodrome, with very well-equipped workshops where they do considerable work in the overhaul of aircraft of all types. The company is the agent for De Havilland aircraft over a large part of England, and also does a large trade in second-hand aircraft. Their workshops are fairly extensive and well fitted, and an apprentice to them should gain a very good all-round training, particularly in the maintenance and overhaul of light aircraft.

They have an apprenticeship scheme covering a period of two years, the premium for which is £50, which is paid back as wages to the apprentice at the rate of 10s. per week the first year, and 15s. per week the second year. During this period they undertake to train apprentices to such a pitch of efficiency that they should be able to qualify for their ground engineers' licences "A" and "C."

COMPER

The Comper Aircraft Co., Ltd., Hooton Park Aerodrome, Cheshire

THE COMPER AIRCRAFT factory is situated in delightful surroundings at Hooton Park, and is at present chiefly engaged upon construction of the Comper "Swift," a light single-seater machine which has obtained outstanding success in races during the past year. It is generally fitted either with the Pobjoy 7-cylinder radial engine or the Gipsy III inverted engine. In both forms it is an interesting little machine, and is selling well to those who wish to travel alone at high speed. It is of wooden construction, but the metal-fitting shop in the works is quite extensive, as the firm make all their fittings themselves.

The firm only takes on a limited number of student apprentices, thus ensuring that each has adequate supervision during his work. A small premium is paid for this advantage in order to cover the cost of such supervision, and the apprentices receive no wages. The course laid out is spread over three years, and entails work in all departments, finishing in the last year in the drawing office. It can however, if required, be modified to suit students' individual requirements. All students are encouraged to attend evening classes to study such subjects as mathematics, mechanics, mechanical drawing, materials, aeroplane construction, etc., and permission is given to take such instruction, or instruction in flying, during working hours if these cannot be taken during the evenings.

(To be continued)

The Industry

PNEUMATIC CUSHIONS

PNEMATIC upholstery is the latest style of upholstery which, in the form of cushions, recommends itself for use in aircraft. Its application for vehicles has so far mainly been confined to cars and motor-cycles, and in this respect it has answered well. Except possibly in very rough weather the airman is not subjected to the violent up-and-down movements that are inflicted on the motorist over rough road surfaces. The airman certainly requires something soft and comfortable to sit upon, but in rough weather he chiefly requires measures like the safety belt which will prevent him being shot out of his chair.

Nevertheless, as he does need a cushion for seating comfort, there is no reason why it should not be a very suitable one, and the pneumatic cushion produced by Paxon, Ltd., is an excellent sample. As its chief springing element is common air, it essentially conforms to the necessary degree of lightness for an aircraft component. The Paxon Air Cushion comprises four parts. First there is what may be termed the rubber bag, with a valve attached for inflation. For the top and sides of this bag a non-extensible rubber material is used, but, conversely, a very elastic rubber is employed for the bottom. The top and bottom are anchored in the full width by means of two or more non-extensible ribs or reeds, forming intercommunicating air chambers by which the air is distributed. When the cushion is under load the elastic rubber at the bottom expands, but the top and sides of non-extensible rubber do not expand. This has the effect of preventing any recoil when the cushion is sat upon. It also results in no sagging, rolling, or "bottoming." The airman is supported on a commodious pocket of air all the time, extending from the bottom of his spine to the back of his knees.

Contributing to the comfort obtained is part two, a wooden bottomless frame with its inner sides tapering, in which the air bag is supported by resting on rubber strips. These strips register with the reeds in the air bag and permit the elastic rubber bottom to expand vertically downwards in the frame when subjected to load—or shocks.

The third part of the Paxon cushion is a case for containing the air bag and bottomless frame. This is upholstered in a suitable material to match the upholstery of the aircraft (if any) or as desired. The external appearance of the complete unit is then similar to ordinary spring-type upholstery. The principle involved in the Paxon design is derived from the theory that the air in a pneumatic cushion should be free, so that when under load it will follow the line of least resistance. By this it means that the cushion is not compressed under load. The

displacement of the air caused by the weight of the body is automatically compensated by the expansion of the bottom of the cushion, which takes the vertical movement downward in the frame as described.

The address of Paxon, Ltd., is 70, Grafton Street, W.1 (Museum 7577).

REID-SIGRIST TURN INDICATOR

IF the natural association of the Turn Indicator with "blind flying" had received as much publicity as "blind flying" has had in our Press lately, it would have merely met with justice. As it is, "blind flying" is no doubt interpreted by the public as sticking a hood over the pilot and leaving him to try his luck at an aerial blindman's buff. The Reid-Sigrist Turn Indicator is now, one is glad to say, widely used, both in the Royal Air Force and in Civil Aviation. A simple yet comprehensive description of this instrument is contained in an illustrated booklet issued by Reid & Sigrist, Ltd., Canbury Park Road, Kingston-on-Thames. The contents also cover the technique of instrument flying and the training of airmen to fly by instruments. The Reid Pitch Indicator is described summarily, an instrument which is designed to be used in conjunction with the Turn Indicator when flying by instruments.

PROTECTION OF ANODICALLY-TREATED DURALUMIN

THE problem of the adequate protection of anodically-treated Duralumin surfaces has engaged the attention of technical experts for some considerable time. We are now informed by Nobel Chemical Finishes, Ltd., the manufacturers of Aircraft Dopes and "Belco" Finishes, that as a result of lengthy experiments with a large number of varying types of material they are now able to offer a new type of Primer which has given exceptionally good results on anodically-treated Duralumin.

This is a "Dulux" Primer and is made on a synthetic base and has excellent properties of adhesion, flexibility and toughness, as well as resist-

ance to atmospheric conditions. It is bright yellow in colour and gives very good priming in one coat. If the finishing colour is not important, two coats of this Primer can be used with excellent results. It is understood that after the six months period of exposure called for by the Air Ministry Specification D.T.D.62, the panels treated with this Primer were all in excellent condition. "Belco" Finishing Coats are recommended for use over the Primer. The value of this material for use on seaplane floats and flying-boat hulls will be appreciated when it is known that one coat of the "Dulux" Primer followed by two coats of "Belco" give excellent protection, as has been proved by severe tests which included not only exposure on a weathering rack with intermittent spraying at three-hour intervals with sea water, but also constant immersion in sea water. Further particulars may be obtained from the manufacturers, whose address is Slough, Bucks.

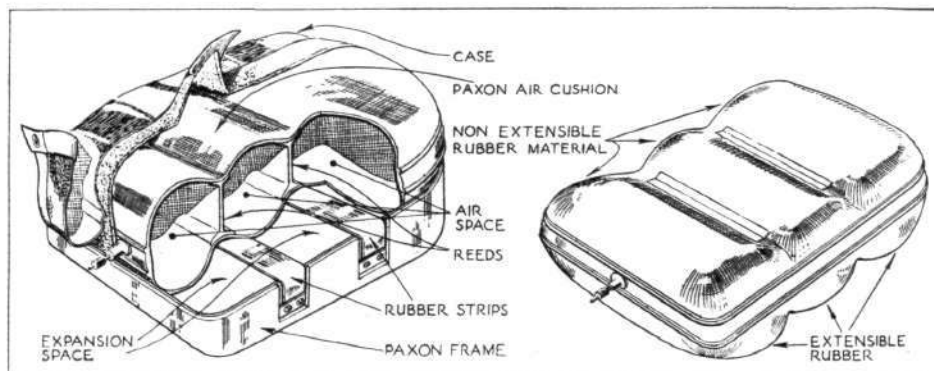
TWO-PLY STAINLESS STEEL

THE Ingersoll Steel & Disc Co., of Chicago, announce a commercially successful two-ply stainless steel. This new metal, to be known as Ing-O-Clad Stainless Steel, is produced by a patented process from the composite ingot. The process assures a perfect bond between the stainless steel surface and the carbon steel back, and the aviation industry will find the new metal applicable where corrosion resistance, strength and finish are desired. Ing-O-Clad may be deep drawn, stamped, welded, formed and polished.

OLYMPIA EXHIBITS

WE pass on a welcome to our readers from K.L.G. Sparking Plugs, Ltd., to visit their stand (424) at the Motor Show (October 13-22). The company are not permitted to exhibit their plugs designed for aero engines, but the comprehensive range of K.L.G. car plugs should be equally as interesting.

The exhibits on Stand 341 of Wellworthy, Ltd., will be their piston and scraper rings, slotted oil-control rings for controlling oil consumption, Simplex patent piston and oil-check rings (they are the sole manufacturers in this country of this fully patented ring, which overcomes excessive oil



The Paxon Air Cushion.

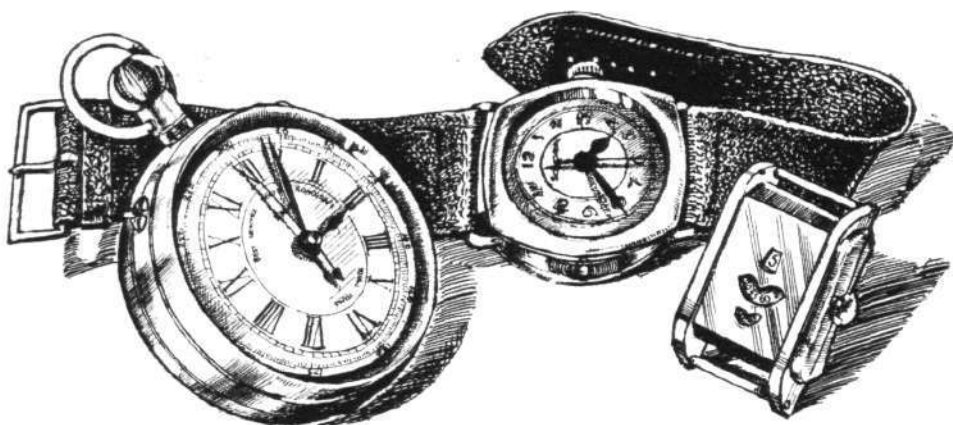
consumption and the elimination of piston slap, even in the worst of worn cylinder bores), piston ring castings in various stages of machining, and boss-free piston, for which full patents have recently been granted.

GOGGLES, ETC.

A NEW goggle is added to the large range of flying equipment stocked by S. Lewis's, 27, Carburton Street, W.1. It embodies the latest improvements in goggles, although kept down in price to a moderate figure. Safety glass, ventilating fans over each goggle, an adjustable bridge and an exceptionally good elastic band (inferior elastic bands often render otherwise good goggles a perfect nuisance, for they quickly lose their elastic qualities and result in a loose fit) are features of this new goggle. The eye-pieces are of sponge rubber and fit shapely and comfortably, and there is good side vision. We would remind clients of S. Lewis's that they have their own workshops with their stores, and willingly make alterations in flying equipment to satisfy personal tastes. They supply flying clubs with a very neat leather jacket, with zip-fasteners and trimmed off with jersey cuffs, collar, etc., in which the club's colours are patterned. The lining is artificial silk. A very light sheepskin flying boot, with zip front and rubber soles, is also in their latest stock.

STOP WATCHES

THREE new watches now being marketed by S. Arnold & Co., of 122, St. John Street, E.C.1, are a 30-hour lever stop watch with accurate lever movement and a dial graduated



The three new Arnold watches described in these columns: the centre wristlet type and the large watch are stop watches. The small wristlet type has a novel face which renders it practically indestructible.

in 1/5th seconds; a wristlet stop watch, and another wristlet type, without hands or glass front, all sold at moderate prices. As the two kinds of stop watches are intended to serve as ordinary timepieces in addition to functioning as stop watches, it should be pointed out that the watches entirely stop functioning when employed for timing speeds, because the ordinary seconds' hand serves a dual purpose. Of course, admittedly the loss of time is infinitesimal. There is an improved side action for stopping and starting these watches which is conveniently handled.

The third watch, the "Unique" wristlet type for ordinary purposes, has a novel face. There are no hands and no large glass front, thus obviating the chances of breakages. The hour, minute and second readings are separately revealed through small slots, the hour figure jumping into position and the minute and second figures gradually revolving into sight.

The seconds' figures are unfortunately very small, and would be hard for a person with imperfect sight to read.

ALUMINIUM

A "PICTURE BOOK" containing a series of photographs in photogravure to illustrate the wide application of aluminium is the latest publication from the British Aluminium Co., Ltd., Adelaide House, King William Street, E.C.4.

REDUCING SHOCK

AN illustrated pamphlet on the slow-motion suspension system designed for cars is available, issued by Slow Motion Suspension, Ltd., James Street West, Bath. The system is one which reduces periodicity and obviates rebound. The concessionaire (to whom inquiries should be addressed) is Norman Edgar, The Airport, Bristol.



An Empire Air Route Film

BRITISH INSTRUCTIONAL FILMS are producing a film which, if it is correctly handled, should prove once and for all that our aircraft flying on regular routes between this country and the further points of the Empire are really doing a useful job of work. As may be imagined, the film is being made largely in collaboration with Imperial Airways, Ltd., and a photographic unit is leaving on November 5 for Karachi, then returning to Athens will pick up the Armstrong-Whitworth "Atalanta" maiden trip down the African route; thus scenes will be taken over the whole of both routes. This is a very fine opportunity for the film industry to do something worth while for British aviation. So far they have only used aircraft for stunts, and have given people little or no conception of the growth which has taken place in our most important means of travel during the last few years. Let us hope that the imaginative sounds and specially written music said to be accompanying the film are neither too loud nor too exotic, and also that the film is not spoiled by the inclusion of some utterly improbable love interest, the like of which we are always told is necessary if the film is to be a box office draw. Both this music and love-interest accompaniment has been invariably overdone so far. Perhaps, however, B.I.F. are learning that people are interested in things as they really are and that "Contact," as the film is called, will turn out even more successful than we all hope.

A.S.T. Activities during September

THE excellence of the instruction available at Hamble is rapidly becoming recognised, and the steady influx of pupils desirous of studying flying as a profession shows that the training provided is meeting a definite want. During the month of September eleven new pupils joined

Air Service Training, Ltd., six of them intending to take courses varying in duration from one to four years. In addition to these, eleven pupils are taking the six months' Wireless Course. Among the new pupils are Mr. W. D. Campbell, an American who is taking extended courses in blind flying, night flying, advanced flying and wireless on various types of land and sea aircraft, and Mr. E. K. Lee, an honorary instructor of the Singapore Flying Club, who is taking the blind flying course and the course for the "B" Pilots' Licence. Mr. Lee Murray (whose article on Australian conditions should be read in FLIGHT for October 6) completed an Instructors' Course at the school last April and is now taking the blind-flying course, while Mr. E. H. Wheelwright is flying the Avro "Tutor" and taking a course in ground subjects prior to entering the R.A.F. next February. During the month six pupils completed the blind-flying course and two the Instructors' Course. Two qualified for the "A" Pilots' Licence and two for the "X" Ground Engineers' Licence for the care and adjustment of compasses. Lt. Rasananda, of the Siamese Military Air Service, completed fifty hours' flying on the Avro "Tutor," Atlas and Siskin aircraft prior to joining the C.F.S., while Mr. Ngo Kok Tie left the school after having successfully completed his training on preliminary and service types of aircraft. With the coming of winter the Squash Court is very popular, and A.S.T. will be glad to hear from any teams who care to meet them in friendly rivalry.

Cheaper "Autogiro" Instruction

READERS who are interested in obtaining flying instruction on the "Autogiro" will be interested to know that the fees in force for this by the Cierva Autogiro Co., Ltd., were reduced on October 1, and now stand at £4 per hour for dual or solo (*ab initio* pupils) and £3 3s. per hour solo instruction (licensed pilots).

THE ROYAL AIR FORCE

London Gazette, October 4, 1932.

General Duties Branch

The following are granted short service commns. as Acting Pilot Officers on probation with effect from and with seny. of Sept. 23:—G. N. Amison, J. W. Buchanan, J. O. Carter, G. J. I. Clennell, H. W. Dean, F. H. Dixon, W. G. E. Elborough, J. C. Evans, P. S. Foss, G. R. Howie, G. O. Llewellyn, T. B. Morton, T. S. Sanders, J. H. G. Sarll, E. T. Smith, D. E. Turner, D. F. Walker, A. K. White, P. N. J. Wilkins. The following are granted temp. commns. as Flying Officers on attachment to R.A.F. (Sept. 18):—Sub-Lieutenants, R.N.: E. G. Clutton, N. Mcl. Kemp, W. P. Lucy, G. W. R. Nicholl, J. C. H. Price. Lieutenant, R.N.: A. R. Burch.

Lt.-Commr. C. A. R. Gibb, R.N., is re-attached to R.A.F. as Flying Officer with effect from Sept. 26, and with seny. of Sept. 1, 1926. The following Pilot Officers are promoted to rank of Flying Officer:—H. V. Horner (Sept. 13); G. L. C. Jenkins, N. P. Samuels (Sept. 29).

Squadron Leader F. W. Trott, O.B.E., M.C., is restored to full pay from half-pay (Sept. 26); Flt.-Lt. B. W. Knox is restored to full pay from half-pay (Sept. 23); Flt. Lt. F. Wooley, O.B.E., D.F.C., is restored to full pay from half-pay (Sept. 26); Air Commodore P. F. M. Fellowes, D.S.O., is placed on half-pay list, Scale A (Sept. 30); Sqdn.-Ldr. F. H. Laurence, M.C., is placed on half-pay list, Scale A, from Sept. 23 to Sept. 30 inclusive; Lt. O. S. Stevinson, R.N., Flying Officer, R.A.F., ceases to be attached to R.A.F. on return to Naval duty (Sept. 26); Sqdn.-Ldr. A. FitzR. Somerset-Leeke, O.B.E., ceases to be seconded for duty with Greek Government and relinquishes acting rank of Wing Commr. (Sept. 23); F./O. A. L. Franks ceases to be seconded for service as Aide-de-Camp to the High Commissioner for Iraq (Sept. 26); Wing Commr. E. H. Johnston, C.V.O., O.B.E., D.F.C., is placed on retired list on account of ill-health (Oct. 1); Flt. Lt. A. E. Gliddon, D.S.M., is placed on retired list on account of ill-health (Oct. 1); Flt. Lt. C. C. Edwards is placed on retired list on account of ill-health (Oct. 5).

The following are placed on retired list (Oct. 1):—Flight Lieutenants: B. Cheesman, M.B.E., E. Parrett, J. J. Teasdale. Flying Officers: A. H. Baker, J. W. Caddy, A. Maughan, C. H. Paget.

F./O. F. C. Edney Hayter is transferred to Reserve, Class A (Sept. 28); F./O. A. G. Lester is transferred to Reserve, Class A (Oct. 3); Flt. Lt. P. S. Mumford (Capt., R.A.R.O.) is transferred to Reserve, Class C (Sept. 20) (substituted for Gazette Sept. 20); Pilot Officer A. Taylor resigns his short service commn. (Sept. 23); F./O. M. H. Clare relinquishes his short service commn. on account of ill-health (Oct. 3); F./O. J. C. B. Tinling relinquishes his short

service commn. on account of ill-health (Sept. 2) (substituted for Gazette Sept. 9).

The following relinquish their temp. commns. in R.A.F. on ceasing to be seconded (Oct. 2):—F./O. F. J. P. Dewhurst (Lt. R. Tank Corps); F./O. A. J. W. Geddes (Lt. R.A.).

Lt. T. S. Jackson, R.N., Flying Officer, R.A.F., relinquishes his temp. commn. on return to naval duty (April 14, 1931). (Substituted for Gazette, April 28, 1931.)

Stores Branch

The following are promoted with effect from Oct. 1:—Flight Lieutenants to be Squadron Leaders: R. F. Osborne, F. H. Sims, R. V. J. S. Hogan. Flying Officers to be Flight Lieutenants: M. W. Keay, A. M. Reidy, J. W. Mitchell, G. L. Worthington, L. Taylor, G. H. Doveton.

Accountant Branch

Flt. Lt. A. J. Moore is placed on half-pay list, Scale A, from Sept. 27 to Sept. 30, inclusive (substituted for Gazette, Sept. 30).

Chaplains Branch

The Rev. W. R. Marsh, B.D., is grntd relative rank of Group Captain on appointment as a Staff Chaplain (Oct. 1); the Rev. S. H. Keen retains relative rank of Group Captain on relinquishing his appointment as a Staff Chaplain (Oct. 1).

ROYAL AIR FORCE RESERVE RESERVE OF AIR FORCE OFFICERS

General Duties Branch

P./O. W. B. Thompson is promoted to rank of Flying Officer (Sept. 30); F./O. L. S. Hill is transferred from Class A to Class C (Oct. 2); P./O. B. G. Horstmann relinquishes his commn. on account of ill-health (Oct. 5). The following Flying Officers relinquish their commns. on completion of service:—H. A. A. Brosse (Aug. 12); F. W. Mundy (Oct. 4).

AUXILIARY AIR FORCE

General Duties Branch

No. 603 (CITY OF EDINBURGH) (BOMBER) SQUADRON.—Flying Officer A. M. Mitchell is promoted to rank of Flight Lieutenant (Aug. 30).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Air Commodore A. S. Barratt, C.M.G., M.C., to H.Q., R.A.F., India, 7.9.32, for duty as Senior Air Staff Officer, vice Air-Cdr. P. H. L. Playfair, C.B., M.C.

Group Captains: A. A. Walser, M.C., D.F.C., to R.A.F. Staff College, Andover, 1.10.32, for duty as Instructor vice Group-Capt. D. C. S. Evill, D.S.C., A.F.C. T. L. Leigh-Mallory, D.S.O., to Air Ministry, Dept. of C.A.S., 1.10.32, for duty as Deputy Director of Staff Duties vice Group-Capt. A. A. Walser, M.C., D.F.C.

Wing Commander R. L. G. Marix, D.S.O., to R.A.F. Base, Malta, 12.9.32, to Command, vice Wing-Com. F. J. Linnell, O.B.E.

Squadron Leaders: A. H. Wann, to No. 202 (F.B.) Sqdn., Malta, 7.9.32, to Command, vice Sqdn.-Ldr. H. W. Evens. H. W. Evens, to R.A.F. Base, Malta, 7.9.32, for flying duties, vice Sqdn.-Ldr. F. M. F. West, V.C., M.C. P. L. Plant, to No. 84 (B.) Sqdn., Shaibah, Iraq, 13.9.32, to command, vice Flt.-Lt. J. F. T. Barrett. P. R. T. J. M. I. C. Chamberlayne, A.F.C., to No. 30 (B.) Sqdn., Mosul, Iraq, 5.8.32, to command, vice Sqdn.-Ldr. G. S. N. Johnston.

Flight-Lieutenants: C. H. Brill, to R.A.F. Base, Calshot, 19.9.32. C. F. C. Coaker, to Station H.Q., Manston, 27.9.32. G. P. Chamberlain, to H.Q., Wessex Bombing Area, Andover, 26.9.32. J. H. M. Reynolds, to R.A.F. Training Base, Leuchars, 27.9.32. B. W. Knox, to No. 3 (F.) Sqdn., Upavon, 23.9.32. D. L. G. Bett, to H.Q., R.A.F., Cranwell, 1.10.32.

Flying Officers: J. M. Israel, to No. 13 (A.C.) Sqdn., Netheravon, 20.9.32. A. L. Franks, to Central Flying School, Wittering, 26.9.32. H. de M. Middleton, to No. 6 (B.) Sqdn., Ismailia, 12.9.32. H. J. Pringle, to Central Flying School, Wittering, 3.10.32. A. Earle, to No. 35 (B.) Sqdn., Bircham Newton, 1.10.32. R. T. P. Clarkson, to No. 409 (F.F.) Flight, 1.10.32. C. J. Farrell, to No. 58 (B.) Sqdn., Worthy Down, 30.9.32. H. V. Satterly, to No. 2 Flying Training School, Digby, 1.10.32. R. C. Hancock, to No. 26

(A.C.) Sqdn., Catterick, 12.9.32. H. H. Leech, to No. 15 (B.) Sqdn., Martlesham Heath, 3.10.32.

Pilot Officer C. H. B. Bullock, to No. 5 Flying Training School, Sealand, 19.9.32, for flying training, on appointment to a Permanent Commn. as Pilot Officer.

Acting Pilot Officers: The undermentioned Acting Pilot Officers are posted to R.A.F. Depot, Uxbridge, on 23.9.32, for short Disciplinary Course, on appointment to Short Service Commns. as Acting Pilot Officers (on probation): G. N. Amison, J. W. Buchanan, J. O. Carter, G. J. I. Clennell, H. W. Dean, F. H. Dixon, W. G. E. Elborough, J. C. Evans, P. S. Foss, G. R. Howie, G. O. Llewellyn, T. B. Morton, T. C. Sanders, J. H. G. Sarll, E. T. Smith, D. E. Turner, D. F. Walker, A. K. White, P. N. J. Wilkins.

Stores Branch

Flying Officer T. A. Head, to No. 25 (F.) Sqdn., Hawkinge, 18.8.32.

Medical Branch

Squadron Leader P. A. Hall, to R.A.F. Depot, 1.10.32, whilst attending post-graduate course at Trinity College, Dublin.

Flight Lieutenants: C. G. J. Nicolls, to Station H.Q., Manston, 1.10.32. B. W. Cross, to R.A.F. Depot, Uxbridge, 1.10.32, whilst attending a post-graduate course of study at Royal London Ophthalmic Hospital. J. Kemp, to R.A.F. Depot, Uxbridge, 3.10.32, whilst attending a post-graduate course of study at London School of Hygiene and Tropical Medicine.

Chaplains Branch

Rev. S. H. Keen, to Station H.Q., Upavon, 1.10.32, for duty as Chaplain (Methodist Church) at Upavon, Netheravon and Old Sarum, vice Rev. J. R. Appleyard. Rev. J. R. Appleyard, to R.A.F. Depot, Aboukir, Egypt, 1.10.32, for duty as Chaplain (United Board).



LATEST VICKERS NIGHT BOMBER: This four-seater biplane is of all-metal construction, and has a wing area of 1,367 sq. ft. The gross weight is 16,400 lb. and the engines are Bristol "Pegasus" type I M.3.

Book Reviews

"Air Navigation," 1st Edition, 1931. By Lt. Com. P. V. H. Weems, U.S.N. (McGraw-Hill Publishing Co., Ltd., Aldwych House, W.C.2). Price 30s.

THE book is a well-arranged, clear and comprehensive work on all aspects of what we call air pilotage and air navigation. The subject is comprised under the coined word "avigation."

The tables, illustrations and graphs are profuse and well done. In particular, the writer would willingly have removed from his review copy the dead reckoning tables of pp. 205-215 for his own use.

Up to Ch. 5, maps are the chief subject. The chapter on the compass is disappointing and open to criticism. It remains for a future edition to explain those idiosyncrasies of the compass which belong in part to northerly turning error and in part to speed errors, and the effect of pitch on E. and W. courses. These are the compass defects which are obscure of cause but all too evident in practical work. To omit explanation is to encourage distrust of compass theory by the averagely uninformed pilot. To make reference to banking of the aircraft in explaining N.T.E. is a fault. The compass card or needle banks on its own account without reference to the aircraft in which it is pendulously supported.

Dead Reckoning or "Air Pilotage" covers some 160 pp. and is clearly explained in theory and practice.

Radio is well covered as regards procedure and method of application, but might with advantage have received some space for operative hints.

Celestial avigation covers some 154 pp., and is evidence of the soundness of the writer's abilities. These chapters cover a wide field readably and succinctly.

Avigation by "precomputed altitudes" is well advertised in this book and appeals to the critic in his rôle of pupil, to be an excellent device, both practically and psychologically.

Aerology (meteorology) seems sound, but perhaps too brief; whilst the "practical" chapter should include a few hints on the use of cursory observations of conditions. There is still a lot to be said for meteorology on the farmers' "my knee aches, so it will rain next week" method.

In "Blind Flying" the shortness of the chapter and lack of positive information were a disappointment. The difficulties are, if anything, put rather too high, and the training and technique too low. There is nothing fundamental in this chapter.

Bibliography and index are profuse; the author's indebtedness to all those whose help he acknowledges must be very much more in his conscience than in reality, for he is evidently very plentifully equipped with personal knowledge and ability to express and arrange it. W. E. J.



More Hillman Enterprise

ON October 11 Mr. Edward Hillman, by way of following up his recent Essex air display, gave a luncheon in honour of Col. F. C. Shelmerdine (Director of Civil Aviation) and the pilots who assisted at the display. As with the other Hillman enterprises, Mr. W. Courtenay was largely responsible for the organisation, and it was no doubt due to him that such a large, representative, and distinctive gathering was collected together for this occasion. Mr. Hillman is a new power, and one might almost say a bright star in the rising firmament of aviation. His methods are unorthodox, but his faith in aviation and his own capabilities is supreme. At the present moment the wiseacres are shaking their heads and saying that he cannot do what he is setting out to do. We shall not be surprised if they are wrong, for a more forceful personality and one with a better appreciation of the business difficulties entailed would be difficult to find. Unfortunately Col. Shelmerdine was unable to be present at the luncheon, and for the purposes of the response to his toast he was represented by Capt. A. G. Lamplugh, of the B.A.I.C. Col. L. Strange, who piloted the "Spartan Cruiser" with the Mayor's party on the occasion of the Romford display, proposed the health of Col. Shelmerdine. He did so in an admirable and witty speech, voicing a plea for the establishment of aerodromes in the vicinity of every town, suggesting that

"Annual Report of the Director of the Meteorological Office," presented by the Meteorological Committee to the Air Council for the year ended March 31, 1932. Published by H.M. Stationery Office, Adastral House, Kingsway, W.C.2. Price 1s. net.

IN its main lines the work of the Meteorological Office during the year under review has continued as in previous years, but the demands made on the Office have continued to grow and every department reports an increase in the number of inquiries received and the amount of information supplied. The year is noteworthy for the completion of three undertakings, the complete reorganisation of the arrangements made at headquarters in London for the preparation of weather forecasts, the successful conclusion of a scheme for simplifying the exchange of meteorological information between the countries of the northern hemisphere, and the completion of a series of tours made by the Superintendent of the Navy Services to the chief naval stations of the world, in order to organise the supply of meteorological information to the Royal Navy when on foreign service.

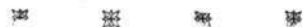
Before the reorganisation of the forecasting arrangements, the supply of forecasts for aviation and for other purposes was the work of two separate divisions, but there was no essential difference between the two types of forecast, and they have now both been placed in charge of the Forecasting Division, thus avoiding a certain amount of duplication. Forecasting work has also been facilitated by the simplification of the exchange of weather information between different countries, which required close international co-operation. After some initial difficulties, the new system is now working smoothly and regularly.

The Aviation Service has provided special assistance for a number of long-distance flights, including two to Australia, two to Africa and one to Japan, and also in connection with several projected transatlantic flights, for the cruise of the airship *Graf Zeppelin* and for the first successful flight by a glider across the English Channel. A beginning has been made, in co-operation with the Automobile Association, with a special service for the supply of meteorological information to owner-pilots.

During 1932-33 will be held the Second International Polar Year, during which a number of countries will send expeditions to high altitudes to obtain data for studies in meteorology and terrestrial magnetism. The Meteorological Office has organised a British expedition to Fort Rae in Canada, under the leadership of Mr. J. M. Stagg, who visited the site during 1931 to make preliminary arrangements. At the end of the year preparations were well advanced for the departure of the party in May, 1932.



these might be situated at the junction of the new arterial roads which are being laid to circumnavigate for the majority of towns. Mr. W. Courtenay proposed the health of the pilots who had assisted at the display, and read out an imposing list of those who were responsible for the success of the occasion. Mrs. J. A. Mollison, in reply, said that as she had undoubtedly taken the longest time of anyone to do the flight from Stag Lane to Romford, she was not fitted to reply to the toast. After referring to the advantage of having her husband at such displays, she asked to be allowed to voice the thanks of everyone to Mr. Hillman for his hospitality. Councillor W. T. Boston proposed the health of Mr. Hillman, saying that their host was one of the most enterprising men they had in Romford, and wishing him every success. Mr. Hillman, in reply, hoped that many more men would be doing the same as he was, in the near future, and finished by thanking all those present for the support they had given him.



NEW COMPANY REGISTERED

THE IRAQ PETROLEUM TRANSPORT COMPANY, LTD. ("private" company).—Capital, £100 in £1 shares. Objects—to manufacture, operate, maintain and deal in airships, airplanes, seaplanes and all other kinds of aircraft, ships, vessels, cars, and conveyances for the transport of passengers and goods, etc. Solicitors: Bischoff, Cox, Bischoff and Thompson, 4, Great Winchester Street, E.C.